Innovative Hearth Products, LLC

Project # 18-468
Model: S210AGL
AKA: C210TGL, C210AGL, T2100GL, WXS2021WS-B
Type: Residential Non-catalytic Wood Fired Heater
May 2, 2019

ASTM E3053 Standard Test Method for Determining Particulate Matter Emissions from Wood Heaters Using Cordwood Test Fuel (EPA ALT-125)

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Contents

Affidavit 3
Introduction 4
Notes 4
Wood Heater Identification and Testing 5
Test Procedures and Equipment 6
Results 7
Summary Table 7
Test Run Narrative 8
Run 1 8
Run 2 8
Run 3 8
Run 4 8
Test Conditions Summary 9
Appliance Operation and Test Settings 9
Settings & Run Notes 9
Appliance Description 10
Test Fuel Properties 13
Sampling Locations and Descriptions 14
Sample Points 14
Sampling Methods 15
Analytical Methods Description 15
Calibration, Quality Control and Assurances 15
Appliance Sealing and Storage 15
Sealing Label 15
Sealed Unit 16
List of Appendices 17

Affidavit

PFS-TECO was contracted by Innovative Hearth Products, LLC (IHP) to provide testing services for the S210AGL Wood-Fired Room Heater per ASTM E3053, *Standard Test Method for Determining Particulate Matter Emissions from Wood Heaters Using Cordwood Test Fuel*, which was approved for use under EPA ALT-125. All testing and associated procedures were conducted at IHP's Auburn, WA Laboratory beginning on 4/10/2019 and ending on 4/11/2019. IHP's Auburn Laboratory is located at 1502 14th St NW, Auburn, WA 98001. Testing procedures followed ASTM E3053 with the exception of caveats described in EPA ALT-125. Particulate sampling was performed per ASTM E2515, *Standard Test Method for Determination of Particulate Matter Emissions Collected by a Dilution Tunnel,* with the exception of caveats described in EPA ALT-125. A copy of EPA ALT-125 is included in Appendix A for reference, as required by the approval letter.

PFS-TECO is accredited by the U.S. Environmental Protection Agency for the certification and auditing of wood heaters pursuant to subpart AAA of 40 CFR Part 60, New Source Performance Standards for Residential Wood Heaters and subpart QQQQ of 40 CFR Part 60, Standards of Performance for New Hydronic Heaters and Forced Air Furnaces, Methods 28R, 28WHH, 28 WHH-PTS, and all methods listed in Sections 60.534 and 60.5476. PFS-TECO holds EPA Accreditation Certificate Numbers 4 and 4M (mobile). PFS-TECO is accredited by IAS to ISO 17020:2012 "Criteria for Bodies Performing Inspections", and ISO 17025:2005 "Requirements for Testing Laboratories." PFS-TECO is also accredited by Standards Council of Canada to ISO 17065:2012 "Requirements for Bodies Operating Product Certification Systems."

The following people were associated with the testing, analysis and report writing associated with this project.



Sebastian Button, Laboratory Supervisor

Introduction

Innovative Hearth Products contracted with PFS-TECO to perform EPA certification testing on S210AGL Wood-Fired Room Heater. All testing was performed at IHP's Auburn Laboratory. Testing was performed by Mr. Sebastian Button.

Notes

- Prior to start of testing, 50 hours of conditioning was performed per ASTM E3053.
- Prior to start of testing, the dilution tunnel was cleaned with a steel brush.
- Front filters were changed on sample train A at one hour for all 4 test runs.
- A total of 4 test runs were performed in accordance with ASTM E3053, Test Run 1 was invalidated due to sampling equipment malfunction. For the remaining 3 tests no anomalies occurred, no further additional tests were performed, see Run Narrative section for further detail on each run.

Wood Heater Identification and Testing

- Appliance Tested: ***S210AGL***
- Serial Number: ***Un-serialized Prototype – PFS Tracking Number 0026***
- Manufacturer*:* ***Innovative Hearth Products, LLC***
- Catalyst: ***No***
- Heat exchange blower: ***Optional***
- Type: ***Wood Stove***
- Style: ***Free Standing***
- Date Received: ***Wednesday, April 10, 2019***
- Testing Period – Start: ***Wednesday, April 10, 2019*** Finish: ***Thursday, April 11, 2019***
- Test Location: ***1502 14th St NW, Auburn, WA 98001***
- Elevation: ***≈69 Feet above sea level***
- Test Technician(s): ***Sebastian Button***
- Observers: ***Winslow Howe of IHP***

Test Procedures and Equipment

All Sampling and analytical procedures were performed by Sebastian Button. All procedures used are directly from ASTM E3053 and ASTM E2515. See the list below for equipment used. See Appendix C submitted with this report for calibration data.

Equipment List:

Equipment ID#	Equipment Description
SN 71712	100lb floor scale w/digital weight indicator
8001993 IHP Box A	APEX XC-60 Digital Emissions Sampling Box A
8001994 IHP Box B	APEX XC-60 Digital Emissions Sampling Box B
057	California Analytical ZRE CO2/CO/O2 IR ANALYZER
064	Digital Barometer
109A/B	Troemner 100mg/200mg Audit Weights
107	Sartorius Analytical Balance
051	10 lb audit weight
090	Dewalt Tape Measure
095	Anemometer
111	Microtector
115	Delmhorst Wood Moisture Meter
EA0015365	Gas Analyzer Calibration Span Gas

Results

The weighted average emissions rate for the 4 run test series was measured to be **1.55 g/hr** with a Higher Heating Value efficiency of **71.0%.** The average CO emission rate for the 3 tests was **1.49 g/min.** The IHP S210AGL Wood-Fired Room Heater meets the 2020 cordwood PM emission standard of ≤ 2.5 g/hr per CFR 40 part 60, §60.532 (c).

Detailed individual run data can be found in Appendix A submitted with this report.

Summary Table

	High Fire Test	Low Fire Test	Medium Fire Test
Date	4/11/2019	4/10/2019	4/11/2019
Run Number	3	2	4
PM Emission Rate (g/hr)	3.27	0.66	1.59
Burn Rate (kg/hr)	2.88	0.91	0.87
Heat Output (BTU/hr)	37,857	12,253	11,817
HHV Efficiency (%)	69.2	71.7	71.3
LHV Efficiency (%)	74.8	76.6	76.3
CO Emissions (g/MJ output)	2.37	6.54	7.1
CO Emissions (g/kg dry fuel)	32.52	93.5	102.27
CO Emissions (g/min)	1.58	1.41	1.49
First Hour Emission Rate (g/hr)	5.21	3.76	4.79
Weighting Factor (%)	20	40	40
Weighted particulate emission average of 3 test runs: 1.55 grams per hour.			
Weighted average HHV efficiency of 3 test runs: 71.0%.			
Average CO emission rate for 3 test runs: 1.49 grams per minute			

*Run 1 was aborted approximately 90 minutes into the test due to sampling equipment malfunction.

Test Run Narrative

Run 1

Run 1 was performed on 4/10/2019 as a high fire test run per ASTM E3053. Emissions sampling began from a cold start ignition of kindling and start-up fuel. The test fuel load was loaded 47 minutes into the test. Sampling was aborted approximately 76 minutes into the test when it was discovered that one of the sample meter boxes what not functioning/logging properly; with no sample volume data the results of the test were invalid. The high fire test fuel load continued to burn while the equipment issues were resolved, and the resulting coal bed was used for the low fire test (Run 2) below.

Run 2

Run 2 was performed on 4/10/2019 as a low fire test run per ASTM E3053, this test was a continuation of the high fire test described above. The overall test duration was 606 minutes. The burn rate for the test run was 0.91 kg/hr. The particulate emissions rate for the test run was 0.66 g/hr. The run had an overall HHV efficiency of 71.7%. The train A front filter was changed at 1 hr. All test results were appropriate and valid. There were no anomalies and all test criteria were met.

Run 3

Run 3 was performed on 4/11/2019 as a high fire test run per ASTM E3053. Emissions sampling began from a cold start ignition of kindling and start-up fuel. The test fuel load was loaded 36 minutes into the test. Testing was completed when 90% of the test fuel load was consumed. Total test time was 186 minutes, main test fuel load burn time was 150 min. The particulate emissions rate from kindling ignition to test completion was 3.27 g/hr. The burn rate of the test fuel load was 2.88 kg/hr. The main test load portion of the run had an overall HHV efficiency of 69.2%. The train A front filter was changed at 1 hr. All test results were appropriate and valid. There were no anomalies and all test criteria were met.

Run 4

Run 4 was performed on 4/11/2019 as a medium fire test run per ASTM E3053, this test was a continuation of the high fire test described above. The overall test duration was 633 minutes. The burn rate for the test run was 0.87 kg/hr, therefore the medium fire category requirements were met, less than the mid-point of the high and low burn rates (1.90 kg/hr). While the burn rate ended up lower than the low burn rate, that is not disqualifying per ASTM E3053, and the air control was set to 0.25” open from fully closed. The particulate emissions rate for the test run was 1.59 g/hr. The run had an overall HHV efficiency of 71.3%. The train A front filter was changed at 1 hr. There were no anomalies and all criteria were met.

Test Conditions Summary

Testing conditions for all runs fell within allowable specifications of ASTM E3053 and ASTM E2515. A summary of facility conditions, fuel burned, and run times is listed below.

Runs	Ambient (°F)		Relative Humidity (%)		Average Barometric Pressure (In. Hg.)	Preburn Fuel Weight (lbs)	Test Fuel Weight (lbs)	Test Fuel Moisture (%DB)	Test Run Time (Min)
	Pre	Post	Pre	Post					
1	Test run aborted halfway through								
2	73	64	35.9	29.7	29.91	21.31	24.33	20.4	606
3	58	71	29.4	28.6	29.72	8.2[1]	21.73	19.1	186
4	71	66	28.4	24.7	29.66	21.73	24.37	19.9	633

[1]This is the weight of the kindling and startup fuel

[2]Total test time was 186 min, high fire test load burn duration was 150 min.

Appliance Operation and Test Settings

The appliance was operated according to procedures as described in the Operations Manual, found in Appendix B submitted with this report. Detailed run information can be found in Appendix A submitted with this report.

Settings & Run Notes

	Pre-Burn Air Setting	Test Run Air Settings
Run 1	N/A – Cold Start Ignition	Air control set to high fire test setting. [Test aborted due to sample equipment malfunction].
Run 2	Air control set to High Fire Setting in accordance with ASTM E3053	Air control set to high fire test setting for first 15 minutes, the set to low fire test setting.
Run 3	N/A – Cold Start Ignition	Air control set to high fire test setting.
Run 4	Air control set to High Fire Setting in accordance with ASTM E3053	Air control set to high fire test setting for first 15 minutes, the set to , medium fire test setting.

Appliance Description

Model(s): S210AGL

Additional Models Discussion: In addition to the S210AGL, the manufacturer also offers the following models: C210TGL, C210AGL, T2100GL, and WXS2021WS-B. These models are identical in firebox construction and air intake/control. The difference between the models is that the S210AGL is a free-standing appliance, while the C210TGL/C210AGL are designed to be a fireplace inserts; AGL and TGL reflect the door frame style (traditional and arched). The T2100GL and the WXS2021WS-B are also free-standing appliances, which feature a flat top, as opposed the step top design of the S210AGL. The differences between to all models are not expected to cause to appliance to exceed to required emissions limit.

Appliance Type: Wood-Fired Room Heater

Firebox Volume: 2.12 ft^3

Air Introduction System: Primary Air enters the firebox from the front bottom of the appliance and is channeled up the sides on the appliance and down through the air wash, as well as through a pilot air opening in the front of the firebox. Primary air is controlled via a damper arm located on the lower side of the appliance which moves out (open) and in (closed). Secondary air is pulled through fixed openings on the sides of the appliance and channeled in through 3 secondary air tubes. Dimensions on all these features can be found in Appendix D.

Baffles: A pair of mating 4.75” x 15.0” x 0.50” vermiculite panels mate together to form a baffle which rests on top of the secondary air tubes The baffle is topped with a 1” think Kaowool blanket.

Refractory Insulation: The firebox is lined with 1” thick firebrick.

Gasketing: The door glass is lined with 1/8” fiberglass gasket, and the door frame seals against the body of the stove with a 7/8” diameter fiberglass rope gasket.

Flue Outlet: 6-inch exhaust outlet located on the top of the appliance.

Catalytic Combustor: N/A

Fan: The S210AGL is optionally offered with a convection fan that attached to the bottom rear of the appliance.

Appliance design drawings can be found in Appendix D submitted with the CBI copy of this report.

Appliance Front



Appliance Left



Appliance Right



Appliance Rear



Test Fuel Properties

Test fuel used was Maple cordwood, split and air-dried to the specified moisture content range. Typical fuel loads are pictured below:

Typical Kindling Load



Typical Startup Load



Typical High Fire Load



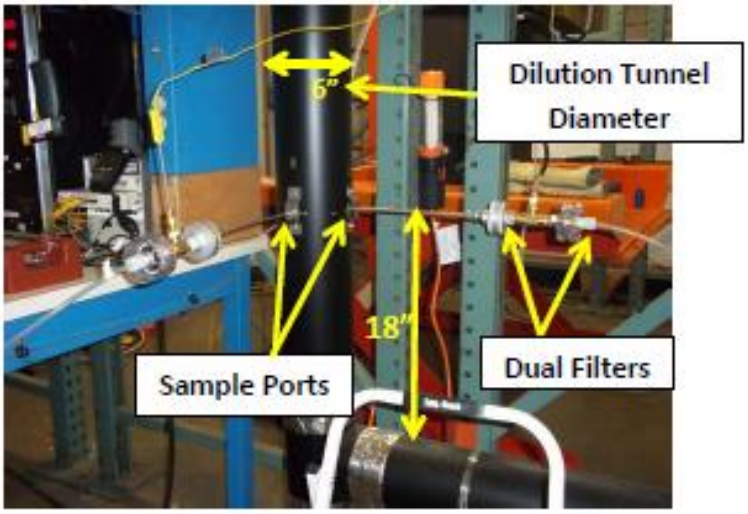
Typical Low Fire Load

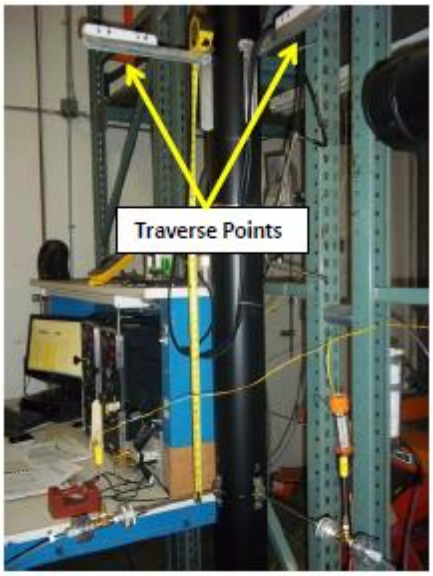


Sampling Locations and Descriptions

Sample ports are located 16.5 feet downstream from any disturbances and 1 foot upstream from any disturbances. Flow rate traverse data was collected 12 feet downstream from any disturbances and 5.5 feet upstream from any disturbances. (See below).

Sample Points





Sampling Methods

ASTM E2515 was used in collecting particulate samples. The dilution tunnel is 6 inches in diameter. All sampling conditions per ASTM E2515 were followed. No alternate procedures were used with the exception of caveats described in ALT-125: Pall TX40 Emfab filters were used, filter temperatures were maintained between 80 and 90°F for all tests, filters were weighed in pairs where applicable, and no sampling intervals fell outside of proportional rates of +/- 10%.

Analytical Methods Description

All sample recovery and analysis procedures followed ASTM E2515 procedures. At the end of each test run, filters, O-Rings and probes were removed from their housings, dessicated for a minimum of 24 hours, and then weighed at 6 hour intervals to a constant weight per ASTM E2515-11 Section 10.

Calibration, Quality Control and Assurances

Calibration procedures and results were conducted per EPA Method 28R, ASTM E2515-11 and ASTM E3053. Test method quality control procedures (leak checks, volume meter checks, stratification checks, proportionality results) followed the procedures outlined.

Appliance Sealing and Storage

Upon completion of testing, the appliance was secured with metal strapping and the seal below was applied, the appliance was then returned to the manufacturer's location at: 1502 14th St NW, Auburn, WA 98001, for archival.

Sealing Label

ATTENTION:

THIS SEAL IS NOT TO BE BROKEN WITHOUT PRIOR AUTHORIZATION FROM THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY.

THIS APPLIANCE HAS BEEN SEALED INACCORDANCE WITH REQUIREMNTS OF 40CFR PART 60 SUBPART AAA §60.535 (a)(2)(vii)

REPORT #_____ DATE SEALED_____

MANUFACTURER_____ MODEL #_____

Sealed Unit



List of Appendices

The following appendices have been submitted electronically in conjunction with this report:

Appendix A – Test Run Data, Technician Notes, Sample Analysis, and Alternate Test Method Approval

Appendix B – Labels and Manuals

Appendix C –Equipment Calibration Records

Appendix D – Design Drawings (CBI Report Only)

Appendix E – Manufacturer QAP (CBI Report Only)

CONTACT YOUR LOCAL BUILDING OR FIRE OFFICIALS ABOUT RESTRICTIONS AND INSTALLATION INSPECTION IN YOUR AREA
COMMUNIQUEZ AVEC LES AUTORITÉS LOCALES EN BÂTIMENT OU LE SERVICE DE PRÉVENTION DES INCENDIES POUR CONNAÎTRE LES NORMES D'INSTALLATION ET D'INSPECTION DE VOTRE RÉGION

Listed Factory-built or Masonry Fireplace Accessory/Insert / Poêle encastrable certifié pour installation dans un foyer de maçonnerie ou préfabriqué

IRONSTRIKE® HEAT FOR LIFE

Manufactured By / Fabriqué Par:
INNOVATIVE HEARTH PRODUCTS
1502 14th St NW
Auburn, WA 98001 USA

PFS C US

"PREVENT HOUSE FIRES"

Install and use only in accordance with manufacturer's installation instructions and your local building codes. Do not connect this unit to a chimney flue serving another appliance.

Optional Blower, Part No.s: H7907 (black), H7909 (nickel), H7910 (brushed nickel)
Blower Electrical Rating: 120V, 60 Hz, 1 Amp
Do not route power cord under or in front of appliance.

Report No./Numéro de Rapport: 14-185

Serial No.
Numéro de série

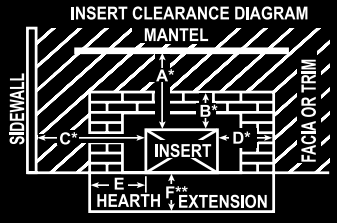
C210GL-

Model / Modèle: Performer™ C210TGL ☐
Performer C210AGL ☐

Tested to/Testé selon: UL 1482, ULC S628

This wood heater needs periodic inspection and repair for proper operation. Consult the owner's manual for further information. It is against federal regulations to operate this wood heater in a manner inconsistent with the operating instructions in the owner's manual.
Certification test emission value 1.55 grams/hr per 2020 cordwood standard

Minimum Clearance to Combustible Materials - Inches (millimeters)



(A) Clearance from Insert top to Mantel = USA-24", CAN-32" (813mm). Maximum mantel depth = 9"
(B) Clearance from insert top to combustible = USA -18" CAN-26" (660mm)
(C) Minimum clearance to combustible sidewall = 18" (450mm)
(D) Minimum clearance to combustible side trim = 15" (381mm)
(E) Minimum distance of floor protection to the side = 8" (200mm). This is measured from the sides of the door opening in the USA and from the sides of the insert in Canada.
(F) Minimum distance from front of insert to combustible = 18" (450mm)

The hearth and/or floor protection must be a thermally rated non-combustible hearth/floor protector meeting or exceeding a thermal rating of k=.84 or equivalent with a listed thickness of 3/8" (9.5mm) minimum in USA (3/4" - 19mm minimum in Canada). Install only in a masonry fireplace, built to UBC Chapter 37 or approved factory-built fireplace (USA only - see owner's manual). Do not remove brick or mortar from masonry fireplace to accommodate insert. Use flue outlet with or without a direct connector. Approved with minimum 6" (152mm) diameter stainless steel listed reline system. Remove and clean behind unit frequently, as creosote build up may occur rapidly. See owner's manual for reductions on mantel, trim and floor protection.
* Reduced clearances may be available for A, B, C, and D dimensions by using optional mantel and/or side shields. Consult with your Innovative Hearth Products dealer for the dimensions of the shields.
** Hearth extension reductions: 2" (51mm) reduction for 2" (51mm) raised hearth. 16" (406mm) minimum hearth extension on all inserts as measured from the door opening of the unit.

CAUTION: HOT WHILE IN OPERATION. DO NOT TOUCH, KEEP CHILDREN, CLOTHING AND FURNITURE AWAY. CONTACT MAY CAUSE SKIN BURNS. SEE NAME-PLATE AND INSTRUCTIONS. DO NOT OVERFIRE - IF HEATER OR CHIMNEY CONNECTOR GLOWS, YOU ARE OVERFIRING. INSPECT AND CLEAN CHIMNEY FREQUENTLY - UNDER CERTAIN CONDITIONS OF USE, CREOSOTE BUILDUP MAY OCCUR RAPIDLY. DO NOT USE GRATE OR ELEVATE FIRE - BUILD WOOD FIRE DIRECTLY ON HEARTH. FEED DOOR MUST BE CLOSED DURING FIRING EXCEPT WHEN ADDING FUEL. KEEP ASH DOOR CLOSED TO AVOID EXCESS HEAT. DANGER: RISK OF ELECTRICAL SHOCK. DISCONNECT POWER BEFORE SERVICING UNIT. FOR USE WITH SOLID WOOD FUEL ONLY.

Date of Manufacture / Date De Fabrication

2019	2020	2021	JAN. JANV	FEB. FEVR	MAR. MARS	APR AVR	MAY MAI	JUN JUIN	JUL JUIL	AUG AOÛT	SEP SEPT	OCT OCT	NOV NOV	DEC DEC
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

U.S. ENVIRONMENTAL PROTECTION AGENCY
Certified to comply with 2020 cordwood standard.

Part No./ No. pièce #900980-03 Rev. 0, 04/2019 DO NOT REMOVE THIS LABEL Made in U.S.A.

"PREVENTION DES INCENDIES"

Installer et utiliser l'appareil en conformité avec les directives d'installation du fabricant et des autorités locales en bâtiment ou le service de prévention des incendies. Ne pas brancher cette unité à un conduit de fumée raccordé à un autre appareil.

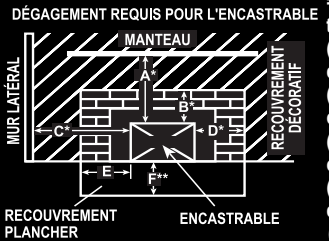
Ventilateur Optionnel, No. De Pièces: H7907 (noir), H7909 (plaqué nickel), H7910 (plaqué nickel, fini brossé)
Spécification Électrique Du Ventilateur: 120V, 60 Hz, 1 Amp
Trans Flow, QLN 652424-3045L

Ne pas faire passer le fil électrique sous ou en avant de l'appareil

Type de combustible: Bois seulement

Cet appareil de chauffage au bois doit être inspecté et entretenu périodiquement pour fonctionner correctement. Voir le manuel du propriétaire pour plus d'information. L'utilisation de cet appareil de chauffage au bois de manière incompatible avec les instructions du manuel du propriétaire constitue une infraction aux régulations fédérales.
Valeur d'émission du test d'homologation 1,55 g/h selon la norme 2020

Dégagements Minimums Aux Matériaux Combustibles - En Pouces (millimètres)



(A) Espace entre l'encastrable et le manteau de cheminée = USA-24", CAN-32" (813mm). Profondeur maximum de la tablette du manteau de cheminée 9"
(B) Espace entre l'encastrable et les matériaux combustibles du haut = USA -18" CAN-26" (660mm)
(C) Espace minimum entre l'encastrable et le mur de côté combustible = 18" (450mm)
(D) Espace minimum entre l'encastrable et les matériaux combustibles du côté = 15" (381mm)
(E) Minimum requis de matériel non combustible au plancher, de chaque côté de l'ouverture de l'appareil = 8" (200mm)
(F) Minimum requis de matériel non combustible à l'avant de l'appareil = 18" (450mm)

Le panneau protecteur de plancher doit être un matériel non combustible, dont l'épaisseur minimale est de 3/4" - 19mm (3/8" - 9.5mm USA) et dont le facteur k est de 0.84 ou l'équivalent. Installer seulement dans un foyer de maçonnerie construit selon UBC Chapitre 37 ou dans un foyer approuvé par le fabricant (référez-vous au manuel). Ne pas enlever de ciment ou de briques pour installer l'encastrable. L'installation de la cheminée peut s'effectuer avec ou sans connecteur à la sortie de l'appareil. Approuvé pour raccordement avec un conduit de tubage certifié en acier inoxydable de 6" (152mm) de diamètre. Tirer l'appareil et nettoyer l'arrière fréquemment car le créosote peut s'y accumuler rapidement.
*Les dégagements minimums peuvent être réduits pour A, B, C, D en utilisant un manteau optionnel et / ou des protecteurs latéraux. Contacter votre détaillant Innovative Hearth Products pour la dimension des protecteurs requise.
**Réduction du recouvrement de plancher : 2" (51mm) de moins si l'encastrable est élevé de 2" (51mm). Respecter 16" (406mm) de recouvrement de plancher minimum à l'avant de l'encastrable.

ATTENTION: L'APPAREIL EST CHAUD LORS DE L'OPÉRATION. NE PAS Y TOUCHER. RISQUE DE BRÛLURES CUTANÉES. TENIR LES ENFANTS, LES MATÉRIAUX COMBUSTIBLES, LES VÊTEMENTS ET LES MEUBLES ELOIGNÉS DE L'APPAREIL. VOIR LA PLAQUE SIGNALÉTIQUE ET LES DIRECTIVES. NE PAS SURCHAUFFER L'APPAREIL. SI L'APPAREIL OU LE TUYAU DE CHEMINÉE ROUGIT, VOUS SURCHAUFFEZ. INSPECTER ET NETTOYER LA CHEMINÉE ET LE TUYAU CONNECTEUR FRÉQUEMMENT. SOUS CERTAINES CONDITIONS, IL SE PEUT QUE LE CRÉOSOTE S'ACCUMULE RAPIDEMENT. NE SURÉLEVER PAS LE FEU À L'AIDE D'UN CHENET. DÉPOSER LES BÛCHES DE BOIS DIRECTEMENT SUR L'ÂTRE. LA PORTE DOIT ÊTRE FERMÉE PENDANT L'USAGE SAUF POUR ALIMENTER LE FEU. GARDER LA PORTE "BY-PASS" (CENDRES) FERMÉE POUR ÉVITER DE SURCHAUFFER. DANGER: RISQUES DE DÉCHARGE ÉLECTRIQUE. DÉCONNECTER LE FIL ÉLECTRIQUE DE LA PRISE DE CONTACT AVANT LE SERVICE. NE PAS FAIRE PASSER LE FIL ÉLECTRIQUE SOUS OU EN AVANT DE L'APPAREIL. POUR USAGE AVEC LE BOIS SEULEMENT.

NE PAS ENLEVER OU RECOUVRIR CETTE ÉTIQUETTE Fabriqué aux U.S.A.

IRONSTRIKE®
HEAT FOR LIFE

INSTALLATION AND OPERATION MANUAL

COUNTRY® COLLECTION

EPA Certified Wood-Burning Fireplace Inserts

Save These Instructions For Future Reference

P/N 900980-00, Rev. NC, 05/2019

P900980-00



Performer™ C210TGL



Performer™ C210AGL

Wood Fireplace Inserts Performer™ Model C210GL

PFS® C US

Report # 14-185

NATIONAL FIREPLACE INSTITUTE NFI CERTIFIED

www.nficertified.org

We recommend that our woodburning hearth products be installed and serviced by professionals who are certified in the U.S. by the National Fireplace Institute® (NFI) as NFI Woodburning Specialists or who are certified in Canada by Wood Energy Technical Training (WETT).

Wood Energy Technical Training www.wettinc.ca

A French manual is available upon request. Order P/N 900980-01.

Ce manuel d'installation est disponible en francais, simplement en faire la demande. Numéro de la pièce 900980-01.

This appliance must be properly installed and operated in order to prevent the possibility of a house fire. Please read this entire installation and operation manual before installing and using your wood fireplace insert. Failure to follow these instructions could result in property damage, bodily injury or even death. Contact your local building or fire officials to obtain a permit and information on any installation requirements and inspection requirements in your area.

⚠ WARNING

- **Hot! Do not touch! The glass and surfaces of this appliance will be hot during operation and will retain heat for a while after shutting off the appliance. Severe burns may result.**
- **Carefully supervise children in the same room as appliance.**

Agency Copy

CONGRATULATIONS!

When you purchased your new wood-burning fireplace insert, you joined the ranks of thousands of individuals whose answer to their home heating needs reflects their concern for aesthetics, efficiency and our environment. We extend our continued support to help you achieve the maximum benefit and enjoyment available from your new wood-burning fireplace insert.

Thank you for selecting an Innovative Hearth Products (IHP) wood-burning fireplace insert as the answer to your home heating needs.

TABLE OF CONTENTS

Using This Manual 2
Important Safety Information 3
Testing Information 4
Draft Requirements 4
Selecting the Proper Venting System 4
Negative Pressure Warning 5
Creosote 5
Ash Disposal 5
Fuel 6
Burn-In Period 6
Paint Curing 6
Brick Installation 7
Required Clearances 8
Hearth Protection 9
Chimney Requirements 10
Installation Procedures-Masonry Chimney 10
Positive Flue Connection 11
Installation Procedure - Factory-Built Zero Clearance Fireplaces 11
Fireplace Pre-Installation Preparation 11
Insert Pre-Installation Preparation 11
Chimney Liner Installation 13
Installing the Insert 13
Post Installation Checks 13
Operating Hints 14
Starting and Maintaining a Fire 14
Blower Operation (optional kit) 15
Operating Techniques and Hints 16
Getting the Most Out of Your appliance 16
Maximizing Your appliance's Overall Efficiency 16
Achieving Clean, Long Burns 16
Maintenance 17
Clean Glass 17
Troubleshooting 19
Do's and Don'ts 20
Smoke Detector Recommended 20
Carbon Monoxide Monitor Recommended 20
Replacement Parts List 21-23
Accessories 24
Safety / Listing Label 25
Warranty 27
Product Reference Information 28

USING THIS MANUAL

Please read and carefully follow all of the instructions found in this manual. Please pay special attention to the safety instructions provided in this manual.

PRODUCT IS SUBJECT TO CHANGE WITHOUT NOTICE

IMPORTANT SAFETY AND WARNING INFORMATION

READ THIS MANUAL IN ITS ENTIRETY AND UNDERSTAND THESE RULES TO FOLLOW FOR SAFETY.

1. When this room heater is not properly installed, a house fire may result. To reduce the risk of fire, follow the installation instructions. Contact local building or fire officials about restrictions and installation inspection requirements in your area.
2. Wear gloves during installation to avoid injury from sharp edges on the insert and/or its parts.
3. This unit is designed and engineered to burn only dry, well-seasoned wood. Burning wet wood will greatly reduce your inserts efficiency, produce excessive amounts of smoke and can cause dangerous chimney fires due to creosote build-up.
4. Before opening the door, **the draft control must be fully open to avoid possible combustion flash** (ignition of hot volatile gases as the door is opened).
5. Never use gasoline, gasoline-type lantern fuel, kerosene, charcoal lighter fluid, or similar liquids to start or 'freshenup' a fire in this heater. Keep all such liquids well away from the heater while it is in use. **DO NOT USE CHEMICALS OR FLUIDS TO START THE FIRE.**
6. While burning, fuel utilizes oxygen from the air in the room. Be sure to allow an adequate amount of fresh air into the room where the insert is burning.
7. The outside surface of the insert will be hot while burning properly and can set items like clothing and curtains on fire. Keep furnishings and other combustible materials away from the insert. Using the heat from the insert to dry wet clothing can be hazardous if clothes are placed too near the surface of the insert.
8. **HOT WHILE IN OPERATION. KEEP CHILDREN, CLOTHING FURNISHINGS AND COMBUSTIBLE MATERIAL A CONSIDERABLE DISTANCE AWAY. CONTACT MAY CAUSE SKIN BURNS.** Do not allow children to play near the insert without close supervision. Do not touch the insert while it is burning. Use extreme caution while the unit is in use. Surface temperatures become dangerously hot and can cause serious burns.
9. Do not allow anyone to operate the insert who is not familiar with the operating instructions.
10. Attempts to achieve heat output rates that exceed insert design specifications can result in permanent damage to the insert. Never leave your insert unattended on high burn rates. This may cause overfiring. Overfiring the insert may cause a house fire. If the insert glows, you are overfiring.
11. Keep a water hose or hand-operated fire extinguisher close for safety.
12. **Smoke Detectors** - Since there are always several potential sources of fire in any home, we recommend installing smoke detectors. If possible, install the smoke detector in a hallway adjacent to the room (to reduce the possibility of occasional false activation from the heat produced by the insert). If your local code requires a smoke detector be installed within the same room, you must follow the requirements of your local code. Check with your local building department for requirements in your area.
13. Inspect your chimney at least once a month during the burning season to check for soot and creosote accumulations. Any accumulations over 1/8" thick should be removed by a professional chimney sweep. Do not attempt to burn out heavy creosote accumulations with a hot fire. If large accumulations are occurring, review your burning procedures.
14. If a creosote fire should develop, the fire department should be called immediately and then attempts should be made to control the fire until assistance arrives. If a "runaway" fire should develop causing over-heating of the insert, the door and draft regulators should be closed immediately. The fire should die down once deprived of oxygen. After a severe chimney fire, the complete chimney system should be checked before further use.
15. Do Not Use Grate Or Elevate Fire - Build Wood Fire Directly On Hearth (firebrick). Do not use andirons or other methods of supporting the fuel.
16. Please read this entire manual before you install and use your new room heater. Failure to follow instructions may result in property damage, bodily injury, or even death.
17. Check all local building and safety codes before installation. The installation instructions and appropriate code requirements must be followed exactly and without compromise. In the absence of local codes the following standards and codes must be followed.
18. In the U.S.A, install in accordance with the National Fire Protection Association's Code, NFPA 211, Standards for Chimneys, Fireplaces, Vents and Solid-Fuel-Burning Appliances, or similar regulations, may apply to the installation of a Solid-Fuel-Burning appliance in your area. In Canada, the guideline is established by the CSA Standard, CAN/CSA-B365-M93, Installation Code for Solid-Fuel-Burning Appliances and Equipment.
19. **DO NOT CONNECT TO OR USE IN CONJUNCTION WITH ANY AIR DISTRIBUTION DUCTWORK UNLESS SPECIFICALLY APPROVED FOR SUCH INSTALLATIONS.**
20. **WARNING: BURNING IMPROPER FUEL (I.E. CHARCOAL) CAN RESULT IN CARBON MONOXIDE POISONING, WHICH MAY LEAD TO DEATH!**
21. **Carbon Monoxide Poisoning** – early signs of carbon monoxide poisoning resemble the flu with headaches, dizziness, or nausea. If you have these signs, get fresh air at once! Have the heater inspected by a qualified service technician. Some people are more affected by carbon monoxide than others. These include pregnant women, people with heart or lung disease or anemia, those under the influence of alcohol, and those at high altitudes.
22. Failure to use manufacturer provided parts, variations in techniques and construction materials or practices other than those described in this manual may create a fire hazard and void the limited warranty.
23. Do not make any make-shift compromises during installation. Any modification or alteration may result in damage to the appliance or dwelling and will void the warranty, certification and listings of this unit.
24. These appliances are designed as supplemental heaters. Therefore, it is advisable to have an alternate heat source when installed in a dwelling.
25. **Do Not Overfire – If Heater or Chimney Connector Glows, You Are Overfiring.**
26. **DO NOT CONNECT THIS UNIT TO A CHIMNEY FLUE SERVING ANOTHER APPLIANCE.**
27. **DO NOT BURN GARBAGE OR FLAMMABLE FLUIDS SUCH AS GASOLINE, NAPHTHA OR ENGINE OIL.**

28. **This wood heater has a manufacturer-set minimum low burn rate that must not be altered. It is against federal regulations to alter this setting or otherwise operate this wood heater in a manner inconsistent with operating instructions in this manual.**

⚠ WARNING

This product can expose you to chemicals including Carbon Black, which is known to the State of California to cause cancer, and Carbon Monoxide, which is known to the State of California to cause birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov

TESTING INFORMATION

This manual describes the installation and operation of these non-catalytic wood heaters. These heaters meet the U.S. Environmental Protection Agency's emissions limits, and is compliant with 2020 EPA NSPS particulate emission standards. This heater has been developed, tested and constructed in accordance with the requirements of UL 1482, ULC S628 and HUD standards and is listed by PFS Corporation. It has been approved for residential and alcove installations.

Model	Emission Rate	BTU/hr Output Range	Max. Output BTU/hr	Tested Average Efficiency
C210GL	1.55 g/hr	9,500-36,100	76,000	71.0%

DRAFT REQUIREMENTS

Your wood fireplace insert is dependent upon a properly functioning chimney for optimum performance. It is a high efficiency appliance that loses much less heat up the chimney than older appliances and fireplaces. For this reason it is important to match the fireplace insert to the chimney. The chimney has two functions:

1. It draws combustion air into the appliance (without air, no fuel will burn) and
2. It exhausts combustion by-products. Your new appliance is what is known as a "natural draft" appliance.

The appliance depends solely on the natural draft of the chimney system to draw combustion air into the unit. Draft is the force that moves air from the appliance up into the chimney. The amount of draft in your chimney depends on the length of the chimney, local geography, nearby obstructions and other factors. Too much draft may cause excessive temperatures in the appliance (overfiring). Slow or inadequate draft equals poor combustion and possible smoking problems. The following are some conditions that may contribute to poor chimney draft:

1. A chimney too large for your appliance.
2. A chimney with not enough height to produce adequate draft.
3. A chimney with excessive height (this may allow exhaust to cool too much before exiting, which will stall the rate the exhaust exits).
4. Offsets in the venting system are too restrictive (see *Chimney Guidelines)*.

Inadequate draft will cause the appliance to leak smoke into the room through the fireplace insert and the chimney connector joints.

Excessive draft may cause an uncontrollable burn or a glowing red fireplace insert or chimney part.

Overfiring Damage - If the heater or chimney connector glows, you are overfiring. Other symptoms may include: Cracking, warping or burning out of components, plated accessories may turn color, stove glass may develop a haze, which will not come off with cleaning.

Overfiring of a stove or fireplace insert is a condition where excessive temperatures are reached, beyond the design capabilities of the appliance. The damage that occurs from overfiring is not covered under the manufacturer's limited warranty.

Also see *Troubleshooting* on ***Page 19***.

SELECTING THE PROPER VENTING SYSTEM

The appliance is merely one component of a larger system. The other equally important component is the venting system. This is necessary for achieving the required flow of combustion air to the fire chamber and for safely removing unwanted combustion by-products from the appliance. If the venting system's design does not promote these ends, the system may not function properly. Poorly functioning venting systems may create performance problems as well as be a safety hazard. **A draft test should read greater than .04' W.C. (inches water column) and less than .08" W.C**. As per NFPA-211 standard (see paragraph below), the installer must take into account all variables within the installation and install the appliance in such a manner that satisfies the draft requirements of the appliance. See *Chimney Guidelines* below to assist you in selecting the proper venting system for your installation.

American National Standards Institute ANSI/NFPA 211, Standard for Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances - See Draft Section: A chimney or vent shall be so designed and constructed to develop a flow sufficient to completely remove all flue and vent gases to the outside atmosphere. The venting system shall satisfy the draft requirements of the connected appliance in accordance with the manufacturer's instructions.

Chimney Guidelines:

- This appliance requires approximately 12 feet minimum of "effective draw" provided by the venting system. As a rule of thumb, every 90 degree total direction change in the venting will result in a loss of approximately 5 feet of "effective draw." Example: If two 45 degree offsets are used, subtract 5 feet from the actual vertical vent height to determine your "effective draw." In this case if you had 14 feet of vertical vent, the effective draw would only be approximately 9 feet (14 ft. - 5 ft. = 9 ft.), therefore it may be necessary to add additional height to the venting system.
- In well insulated and weather tight homes, it may be difficult to establish a good draft up your chimney. The poor draft is caused by a shortage of air in the house *(see Negative Pressure Warning on **Page 5**)*.

Chimney Height Requirements

The chimney must extend 3' (.92m) above the level of roof penetration and a minimum of 2' (.61m) higher than any roof surface within 10' (3m) (see below). Check with your local building officials for additional requirements for your area.

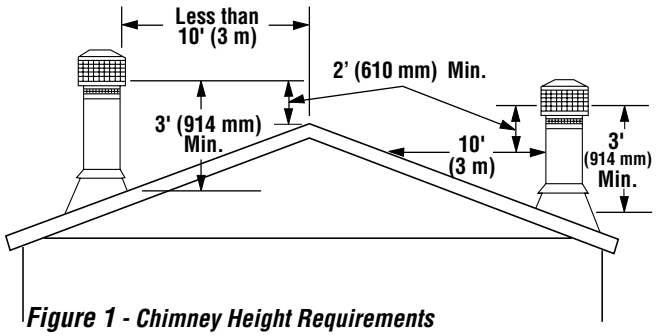


***Figure 1** - Chimney Height Requirements*

To pass inspection in nearly any jurisdiction, the chimney must meet both safety and exhaust flow requirements. The (3' by) 2' by 10' rule applies to both masonry and factory-built chimneys.

**** Ref. USA - National Standard, NFPA 211-latest edition and Canada National Standard CSA B365-01-latest edition. Vents installed with a listed cap shall terminate in accordance with the terms of the cap's listings.***

NEGATIVE PRESSURE WARNING

This appliance is not designed to be operated in a negative pressure. In very airtight homes with large kitchen exhaust fans, furnace cold air returns, fresh air exchange systems and any other air system in close proximity to the heating appliance may create a negative pressure in the same room as the heating appliance. This can create dangerous back drafting of the fireplace insert and chimney joints, drawing combustion by-products into the home. Be sure your home has adequate makeup air to eliminate negative pressures caused by the above-mentioned sources. IHP accepts no liability for damages resulting from negative pressures described above.

Ventilation Requirements - Provide adequate air for combustion. The fresh air requirements of this appliance must be met within the space where it will be installed. Ventilation is essential when using a Solid-Fuel-Burning heater. In well insulated and weather tight homes, it may be difficult to establish a good draft up the chimney (caused by a shortage of air in the home). The lack of air is caused by many common household appliances which exhaust air from the home (such as a furnace, heat pump, air conditioner, clothes dryer, exhaust fans, fireplaces, and other fuel burning appliances). Also, the combustion process of this heater uses oxygen from inside the dwelling. If the available fresh air delivery in the dwelling is insufficient to support the demands of these appliances, problems can result (i.e. excessive negative pressure can develop in the dwelling which will affect the rate at which this appliance can draft thus resulting in performance problems. To correct this problem it may help to open a window (preferably on the windward side of the house).

CREOSOTE, FORMATION AND NEED FOR REMOVAL

When wood is burned slowly, it produces tar and other organic vapors, which combine with expelled moisture to form creosote. The creosote vapors condense in the relatively cool chimney flue of a slow-burning fire. As a result, creosote residue accumulates on the flue lining. When ignited, this creosote makes an extremely hot fire. The chimney and chimney connector should be inspected at least once monthly during the heating season to determine if a creosote buildup has occurred. If creosote has accumulated (1/8" [3mm] or more), it should be removed to reduce the risk of a chimney fire.

Establish a routine for the fuel, wood burner and firing technique. Check daily for creosote build-up until experience shows how often you need to clean to be safe. Be aware that the hotter the fire the less creosote is deposited, and weekly cleaning may be necessary in mild weather even though monthly cleaning may be enough in the coldest months. Contact your local municipal or provincial fire authority for information on how to handle a chimney fire. Have a clearly understood plan to handle a chimney fire.

DISPOSAL OF ASHES

Whenever ashes get 3 to 4 inches deep in your firebox, and when the fire has burned down and cooled, remove excess ashes. Leave an ash bed approximately 1 inch deep on the firebox bottom to help maintain a hot charcoal bed.

Ashes should be scooped out of a cool stove or fireplace insert with a small metal shovel. Ashes should be placed in a steel container with a tight fitting lid and moved outdoors immediately. Other waste shall not be placed in this container. The closed container of ashes should be placed on a non-combustible floor or on the ground, well away from all combustible materials, pending final disposal. If the ashes are disposed of by burial in soil or otherwise locally dispersed, they should be retained in the closed container until all the cinders have thoroughly cooled. Ashes can ignite up to 72 hours after removal from the fireplace insert.

FUEL

This appliance is designed to burn dry seasoned natural wood only (see *Page 20* for a list of prohibited fuels). Failure to burn proper fuels only will void the certification and the warranty of the appliance.

Dry, seasoned wood is that which has been cut, split and allowed to dry under a covered area where air is free to flow and circulate under and around the wood (not under a tarp or plastic). Make sure wood is not stacked directly on the ground, it may absorb moisture from the ground. It should be allowed to dry in these conditions for a minimum of six months, preferably one year or more. **IT MUST BE UNDERSTOOD THAT WOOD CANNOT BE LEFT IN ANY KIND OF WET OR DAMP AREA OR IT WILL NEVER BECOME COMPLETELY SEASONED.**

Do Not store fuel within space heater installation clearances or within the space required for refueling and ash removal.

DO NOT OVERFIRE THIS HEATER

Attempts to achieve heat output rates that exceed heater design specifications can result in permanent damage to the heater.

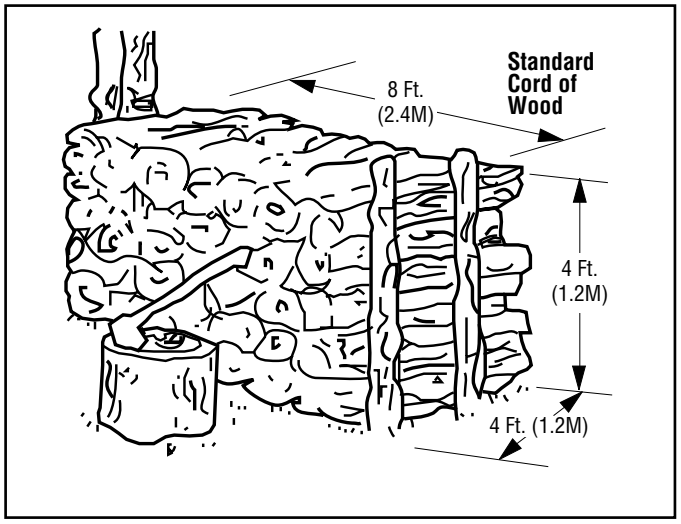
What does "Well-Seasoned" mean?

When a tree is cut down, the wood is green, full of sap and moisture. This moisture content can exceed 80%, which must be reduced to less than 20%. Wood properly seasoned is then capable of generating the heat the stove was designed to provide.

Green wood does not burn easily. Attempting to burn green wood often results in a lot of smoke and very little fire. Time is the most important factor in seasoning wood. Ideally the moisture content should be reduced to 11-20%. ***NOTE: The use of a firewood moisture meter is recommended to ensure the firewood contains less than 20% moisture.***

Seasoning Guide
Softwoods - 6 months to 18 months
Hardwoods - 12 months to 24 months

Logs that are 5" diameter across or larger should be split in half, three pieces if over 8 inches, and four pieces when over a foot across. If a tree has been dead for 2 - 4 years it still needs to be cut, split, and seasoned for 6 to 24 months depending on the wood.



PAINT CURING

If your appliance has plated accessories, be sure to clean it with a household type glass cleaner and a very soft cloth to remove any fingerprints and residues prior to the first fire and before any fire if the plated accessory has been handled or soiled. Do not close the door tightly during the "Burn-In Period." Also, open the door frequently (every 5-10 minutes) to keep the gasket from adhering to the curing paint. Ventilate the house well during these first firings as the paint gives off carbon dioxide and unpleasant odors. It is recommended that persons sensitive to an imbalance in the indoor air quality avoid the appliance during the curing process.

Your new appliance is painted with a high temperature paint that cures during the first few firings. We recommend that you put your stove or fireplace insert through a regimen of three burns. The first two should last for 20 minutes each at 250 degrees (the appliance should be allowed to cool completely between each burn). The third should be a burn of at least 450 degrees F. for 45-60 minutes. The paint will become soft, gummy and emit non-toxic smoke during these burns. After the appliance cools down for the third time, the paint will harden. **DO NOT BUILD A LARGE ROARING FIRE UNTIL THIS CURING EFFECT IS COMPLETE OR YOU MAY DAMAGE THE FINISH OF YOUR STOVE OR INSERT.** Spray can touch-ups should be done only with a high temperature stove paint (cat. no. H8159), available from all IHP dealers.

BURN-IN PERIOD

Please be patient with the heat output of your appliance for the first few weeks. The steel will go through a curing process that eliminates moisture, which is deep in the steel and firebrick. This moisture will reduce initial heat output of your appliance and may make it difficult to start. **(DO NOT OVERFIRE THE STOVE OR INSERT DURING THIS PROCESS. IF THE STOVE OR CHIMNEY BECOMES RED, REDUCE THE AMOUNT OF AIR ENTERING THE STOVE OR INSERT IMMEDIATELY).**

NOTE: DIAGRAMS & ILLUSTRATIONS ARE NOT TO SCALE.

BRICK INSTALLATION

CAUTION: Wear gloves during brick installation in case of sharp edges behind the fireplace insert.

NOTE: *Installation of the baffle boards and baffle blankets are easier when you can still access the flue outlet, (before connecting the flue vent).* ***Be sure the baffle blankets are placed flat on the baffle boards so as not to block exhaust flow to the flue.*** *Use a ruler or a piece of kindling to reach over the baffle blanket to be sure it is completely flat on top of the baffle boards.*

Measure bricks before installing, as per list of dimensions on next page, to be sure the correct bricks are installed in the correct location.

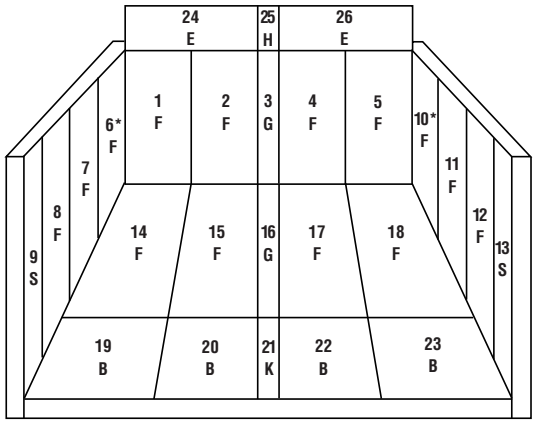
1. Install bricks #1-26 in the numbered sequence shown in ***Figure 2***. **Important: The secondary burn tubes at the top of the firebox are supported by a metal bracket. Move this bracket so it is centered left and right on the tubes. Also make sure the small supporting brackets on the front and rear tubes are centered and hanging from the steel rods at the front and rear of the fireplace insert.**
2. Next, you will install the baffle boards. All 4 baffle boards included are the same size which is 15" x 4-3/4". You will start by installing the boards in the center part of the unit on top of the secondary tubes to each side of the baffle support with the 15" side of the baffle board going from the front to back of the unit. Once you have the first two boards installed slide the board to the left side of the baffle support all the way to the left and rear of the unit. You will slide the board to the right side of the secondary support to the right and rear of the unit. Next you will install the two remaining boards where you originally installed the first two boards on each side of the baffle support and pushed against the rear of the unit. The stainless steel support hanger should be centered left to right between the sets of baffle boards and placed as shown in ***Figure 4***.
3. Also included with the unit are two 15" x 10" x 1" thick baffle blankets. Install each blanket above the baffle board to each side of the secondary support with the 15" side of the blanket from front to rear of the unit. Make sure that the baffle blankets are to the full rear of the unit.

CAUTION: Make sure the baffle blankets are down flat on the baffle boards, pulled together in the center so that no gaps exists between them and do not protrude beyond baffle boards. It is critical that baffle boards and baffle blankets are fully against the rear of the unit.

WARNING: IF THE BRICKS ARE NOT INSTALLED EXACTLY AS SHOWN BELOW, THEY COULD FALL OUT OF PLACE DURING REFUELING OR BURNING OF THE FIREPLACE INSERT CAUSING SERIOUS INJURY!

Brick Sizes (see Figures on this page)

E = 3 x 9"
F = 4-1/2 x 9"
G = 1-1/2 x 9"
H = 1-1/2 x 3"
K = 1-1/2 x 5-1/2"
S = 2-1/8"



Firebox Brick Layout as Viewed from the Front

*** Bricks 6 and 10 fit up against the back of the firebox.**

*** Fits against the back of the firebox.**

NOTE: These bricks may be slightly smaller to adjust for steel and firebrick tolerances beyond our control. Be sure to measure and mark bricks with their numbers when removing.

Figure 2 - Firebox Brick Layout Viewed From the Front

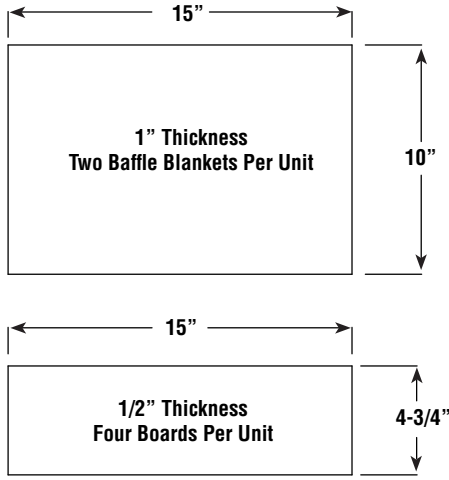


Figure 3 - Baffle Insulation Parts

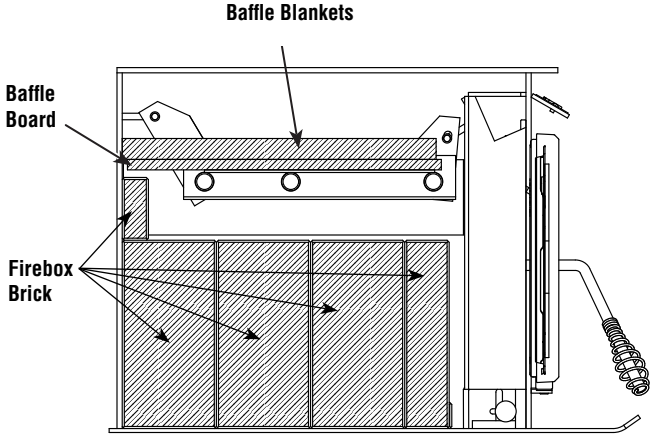


Figure 4 - Side Cut-A-Way View of Firebox

NOTE: DIAGRAMS & ILLUSTRATIONS ARE NOT TO SCALE.

REQUIRED CLEARANCES

WARNING: BE ABSOLUTELY SURE THE DISTANCE BETWEEN THE HEATER AND THE SURFACE OF ANY COMBUSTIBLE CONSTRUCTION IS NOT LESS THAN SHOWN ON THIS PAGE.

Model	*A	*B	*C	*D	E(1)
C210GL	USA-24" CAN-813mm	USA -18" CAN-660mm	18" 450mm	15" 381mm	USA-8" CAN-200mm
C210GL w/mantel and/or side shields ❶	USA-16" CAN-813mm	USA -10" CAN-660mm	18" 450mm	USA-8" 381mm	USA-8" CAN-200mm

Model	F (1)	G	H	J(2)	M
C210GL	18" 450mm	12-1/4" 311mm	19" 483mm	4-1/2" 114mm	42-1/8" 1070mm
C210GL w/mantel and/or side shields ❶	18" 450mm	12-1/4" 311mm	19" 483mm	4-1/2" 114mm	34-1/8" 867mm

* Reduced clearances may be available for A, B, C and D dimensions per NFPA 211 - latest edition, Standard for Chimneys, Fireplaces, Vents and Solid Fuel-Burning Appliances (in Canada CSA B365 - latest edition). See section on "Reduction of Appliance Clearance with Specified Forms of Protection."

** Side view of optional mantel deflector shown.

(1)Hearth extension reductions: 2" (51 mm) reduction for 2" (51 mm) raised hearth. (USA) 16" minimum hearth extension on all stoves and inserts as measured from the door opening of the unit. (Canada) 18"(450 mm) minimum hearth extension on all stoves and inserts as measured from the door opening of the unit. Minimum distance of floor protection to the side = 8" (200 mm). This is measured from the sides of the door opening in the USA and from the sides of the insert in Canada.

(2) J = Maximum lintel depth without flue offset or smoke deflector.

NOTES:

- ***Facing material that projects more than 3/4" (19 mm) from the wall is considered a mantel or side wall.***
- ***This appliance may be installed in a bedroom in the United States.***

C210GL	ZC Fireplace UL 127	Masonry Fireplace UBC Chapter 37
Depth Min.	12-1/2" (318mm)	12-1/2" (318mm)
Height Min.	21" (533mm)	19-1/4" (489mm)
Width Min.	36" (914mm)	26" (660mm)
Lintel Max. Depth ❶	4-1/2" (114mm)	4-1/2" (114mm)
❶ *Without use of adjustable offset box or smoke deflector*		

Table 1 - Fireplace Sizing

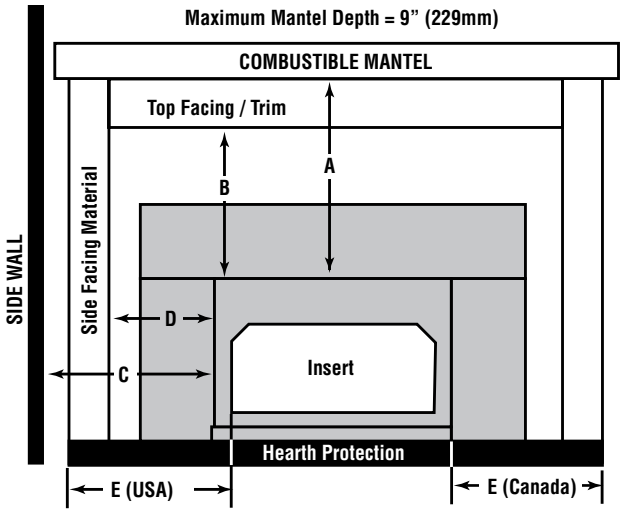


Figure 5

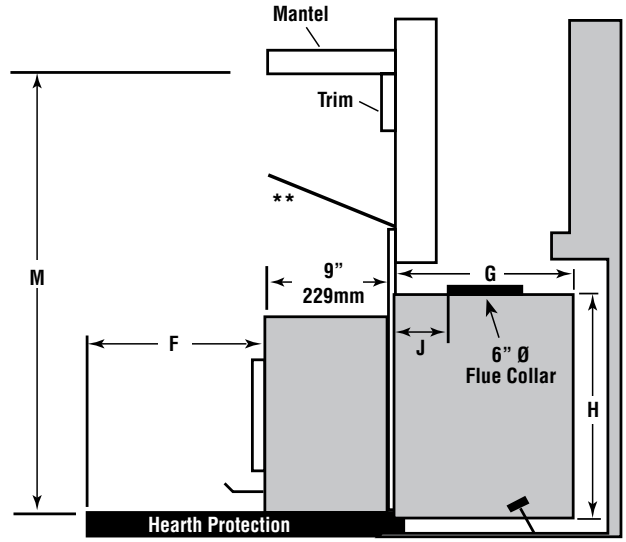


Figure 6

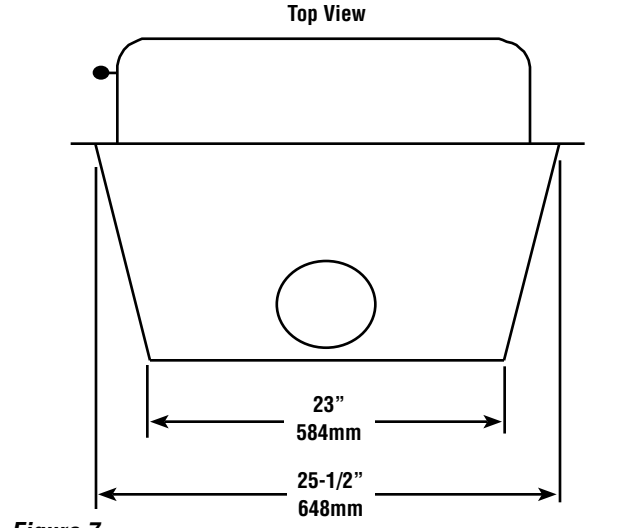


Figure 7

NOTE: DIAGRAMS & ILLUSTRATIONS ARE NOT TO SCALE.

HEARTH PROTECTION

The hearth and/or floor protection must be a thermally rated non-combustible hearth/floor protector meeting or exceeding a thermal rating of k=.84 or equivalent with a listed thickness of 3/8" (9.5mm) minimum in USA (3/4" - 19mm minimum in Canada). The covering must extend 18" (450mm) in front of the heater and 8" (200mm) to either side (measured from door opening in the USA and measured from the side of the unit in Canada).

Using Alternate Material As Floor / Hearth Protection

The hearth extension or alternate material used as a floor/hearth protector must be constructed of a durable noncombustible material having an equal or better thermal conductivity value (lower k value) of k =.84 BTU/IN FT2 HR °F or a thermal resistance that equals or exceeds r = 1.19 HR °F FT2 IN/BTU with a minimum thickness of 3/8" in USA or 3/4" in Canada. With these values, determine the minimum thickness of the alternate material required using the formula(s) and shown in ***Table 2 for USA and Table 3 for Canada***.

NOTE: *Any noncombustible material having a minimum thickness of 3/8"(9.5 mm) for USA or 3/4" (19mm) in Canada whose k value is less than .84 or whose r value is more than 1.19 is acceptable. If the alternate material used has a higher k value or lower r value will require a greater thickness of the material used. In some cases, if the k value is less or the r value higher, a thinner material may be used.*

Methods of determining floor protection equivalents:
To determine the thickness required for the alternate material when either the **"k"** value or **"r"** value is known, use either the **k formula** or **r formula**.

Example: If Micore 160 Mineral Fiber Board is to be used for the floor protection, how thick must this material be?

k_M = k value per inch of ***alternate*** material
r_M = r value per inch of ***alternate*** material
T_M = minimum thickness required for ***alternate*** material
T_s = standard thickness of the ***alternate*** material

k_L = k value per inch of ***listed*** material
r_L = r value per inch of ***listed*** material
T_L = minimum thickness of ***listed*** material

NOTE: An asterisk "*****" indicates, it is a value taken from ***Tables 2 and 3***.

FOLLOWING EXAMPLES ARE CALCULATED FOR USA REQUIRMENTS

Using the k formula:

Minimum thickness of alternate material (T_M) = k-value (per Inch) of alternate material (k_M) / k-value (per inch) of listed material (k_L) x Specified min. thickness of listed material (T_L)

$$T_M = \frac{k_M}{*.84} \times T_L$$

$$T_M = \frac{*.35}{*.84} \times .375"$$

.156 (inches)= .417 x .375"

Answer - The minimum required thickness of the Micore 160 is .156" therefore round up to nearest standard thickness available which is 5/32" (.156")

Using the r formula:

Minimum thickness of alternate material = r-value (per Inch) of listed material / r-value (per inch) of alternate material x Specified min. thickness of listed material

$$T_M = \frac{r_L}{r_M} \times T_L$$

$$T_M = \frac{*1.19}{*2.86} \times .375"$$

.312 (inches)= .416 x .375"

Answer - The minimum required thickness of the Micore 160 is .156" therefore round up to near est standard thickness available which is 5/32" (.156")

Listed Material			
	k (per inch)	r (per inch)	Listed Min. Thickness
Listed Material	.84 K_L	1.19 r_L	3/8" (.375") T_L
** Approved Alternate Materials for Floor/Hearth Protection			
Alternative Materials	Thermal Values		Minimum Thickness (rounded to nearest 1/8 inch)
	k (per inch) K_M	r (per inch) r_M	Min. Thickness T_M
Kaowool M Board	.47	2.13	.42" (1/2")
Micore 160™ *U.S. Gypsum*	.35	2.86	.31" (3/8")
Micore 300™ *U.S. Gypsum*	.46	2.17	.41" (1/2")
Durock™ Cement Board *U.S. Gypsum*	1.92	.52	1.71" (1-3/4")
Hardibacker™	1.95	.51	1.74" (1-3/4")
Hardibacker 500™	2.30	.43	2.05" (2-1/8")
Cultured Stone Hearthstone™	2.82	.35	2.52" (2-5/8")
Wonderboard	3.23	.31	2.88" (3")
Super Firetemp M *Johns-Manville*	.61	1.64	.54" (5/8")
Super Firetemp L *Johns-Manville*	.54	1.85	.48" (1/2")
Face brick	9.00	.111	8.04" (8-1/8")
Common brick	5.00	.20	4.46" (4-1/2")
Cement mortar	5.00	.20	4.46" (4-1/2")
Ceramic tile	12.5	.08	11.16" (11-1/4")
Marble	~11	~.09	9.82" (9-7/8")

Table 2 - USA REQUIREMENTS

***** If the hearth extension material(s) that is intended to be used is NOT listed on Table 1, the material can still be used if the material(s) is noncombustible. However, the manufacturer of the material must provide either the listed k-value per inch or r-value per inch with listed thickness so that the minimum thickness required for the hearth can be calculated (per instructions here or as specified in the NFI Certification Manuals).***

SEE TABLE 3 ON FOLLOWING PAGE FOR CANADA REQUIREMENTS

NOTE: DIAGRAMS & ILLUSTRATIONS ARE NOT TO SCALE.

FOLLOWING EXAMPLES ARE CALCULATED FOR CANADA REQUIRMENTS

Using the k formula:

Minimum thickness of alternate material (T_M)	=	k-value (per Inch) of alternate material (k_M) / k-value (per inch) of listed material (k_L)	x	Specified min. thickness of listed material (T_L)
T_M (inches)	=	$\frac{k_M}{*.84}$	x	T_L
T_M (inches)	=	$\frac{*.35}{*.84}$	x	.75"
.312 (inches)	=	.417	x	.75"

Answer - The minimum required thickness of the Micore 160 is .312" therefore round up to nearest standard thickness available which is 3/8" (.375")

Using the r formula:

Minimum thickness of alternate material	=	r-value (per Inch) of listed material / r-value (per inch) of alternate material	x	Specified min. thickness of listed material
T_M (inches)	=	$\frac{r_L}{r_M}$	x	T_L
T_M (inches)	=	$\frac{*1.19}{*2.86}$	x	.75"
.312 (inches)	=	.416	x	.75"

Answer - The minimum required thickness of the Micore 160 is .312" therefore round up to nearest standard thickness available which is 3/8" (.375")

Listed Material			
	k (per inch)	r (per inch)	Listed Min. Thickness
Listed Material	.84 (K_L)	1.19 (r_L)	3/4" (.75") (T_L)
** Approved Alternate Materials for Floor/Hearth Protection			
Alternative Materials	Thermal Values		Minimum Thickness (rounded to nearest 1/8 inch)
	k (per inch) (K_M)	r (per inch) (r_M)	Min. Thickness (T_M)
Kaowool M Board	.47	2.13	.42" (1/2")
Micore 160™ *U.S. Gypsum*	.35	2.86	.31" (3/8")
Micore 300™ *U.S. Gypsum*	.46	2.17	.41" (1/2")
Durock™ Cement Board *U.S. Gypsum*	1.92	.52	1.71" (1-3/4")
Hardibacker™	1.95	.51	1.74" (1-3/4")
Hardibacker 500™	2.30	.43	2.05" (2-1/8")
Cultured Stone Hearthstone™	2.82	.35	2.52" (2-5/8")
Wonderboard	3.23	.31	2.88" (3")
Super Firetemp M *Johns-Manville*	.61	1.64	.54" (5/8")
Super Firetemp L *Johns-Manville*	.54	1.85	.48" (1/2")
Face brick	9.00	.111	8.04" (8-1/8")
Common brick	5.00	.20	4.46" (4-1/2")
Cement mortar	5.00	.20	4.46" (4-1/2")
Ceramic tile	12.5	.08	11.16" (11-1/4")
Marble	~11	~.09	9.82" (9-7/8")

Table 3 - CANADA REQUIREMENTS

CHIMNEY REQUIREMENTS

This appliance is approved for use in a masonry fireplace built to UBC Chapter 37 or equivalent with a minimum 26" (660 mm) opening at the front of the fireplace.

These heaters are designed to be installed into an existing masonry fireplace (built to UBC 37 or ULC S628 standards) or factory-built, solid-fuel and wood-burning fireplaces (listed to UL 127 or ULC S610) only.

Do not remove brick or mortar from masonry fireplace to accommodate insert. Approved with or without positive flue connection. Approved with minimum 6" (152 mm) diameter stainless steel listed reline system. Country Collection inserts are tested to UL 1482 / ULC S628 and listed by PFS Corporation.

IMPORTANT NOTE: See *Draft Requirements* and *Selecting a Proper Venting System* on ***Page 4*** to assist you in choosing the proper venting system for your installation.

Remove and clean behind unit frequently, as creosote build-up may occur rapidly.

WARNING: CHIMNEY CONNECTOR MUST BE IN GOOD CONDITION AND KEPT CLEAN. DO NOT INSTALL DAMAGED PARTS.

INSTALLATION PROCEDURES - MASONRY CHIMNEY

NOTES:

- *Although not required, a full-length stainless steel liner is recommended for optimum safety and performance. If a full-length liner is not used and a consistent draft cannot be maintained during operation, it may be necessary to use a full-length liner. See your IHP dealer for details.*
- *When installing Your appliance with a positive flue connection, be sure to leave the insulation off the surround panels (flanges) and leave a 1/4" (6 mm) airspace insulation off the surround panels and the facing of your fireplace.*
- *This appliance may be vented into a code-approved masonry chimney with flue liner.*

1. **READ ENTIRE INSTALLATION INSTRUCTIONS**.
2. Check all **REQUIRED CLEARANCES** as specified in the previous section ***(Page 8)*** of this installation and operation manual.
3. Wear gloves during installation in case of sharp edges on the fireplace insert and it's parts.
4. Open or remove the existing fireplace damper. Make sure the damper cannot fall closed.
5. Install the two 1/2" x 3" (13 mm x 76 mm) leveling bolts -heads up- a few turns in the leveling nuts on each side of the outer chamber of the insert at the lower rear corners.
6. Position the insert in the center of the fireplace opening and push it back until the surround brackets are approximately 2" (51 mm) away from the fireplace front.
7. Install the side surround panels and push the insert up snug against the fireplace face. Then with the location selected remove the surround panels and level the fireplace insert with the leveling bolts using a 3/4" (19 mm) socket, extensions (to reach the bolt head) and a ratchet.
8. Glue the insulation around the outer edge of both the top and side surround panels.
9. Install the surround panels loosely, align and tighten. Check for a tight fit against the fireplace.
10. Install the brick and baffle as per instructions on ***Page 7***.

NOTE: DIAGRAMS & ILLUSTRATIONS ARE NOT TO SCALE.

POSITIVE FLUE CONNECTION

A positive flue connection is providing a seal between the vent pipe or liner and the existing fireplace chimney for the purpose of preventing room air passage to the chimney cavity of the fireplace. There are different approved methods to achieve this. See *Direct Connect Positive Flue Connection* on this page.

When creating a positive flue connection, a positive flue connector ring kit is required (sold separately - see *Figure 8).* The connector ring kit (listed below) provides a means to directly attach rigid pipe or a flex pipe adaptor to the flue outlet.

71161 - 6" Positive Flue Connector Ring Kit

Install connector ring kits per instructions provided in kits

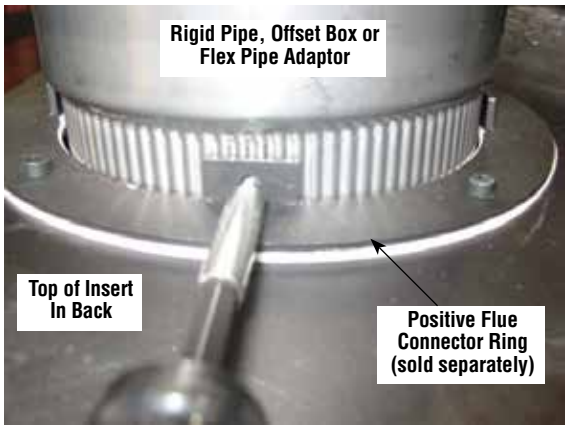


Figure 8 - Connector Ring Kit

Direct Connect Positive Flue Connection

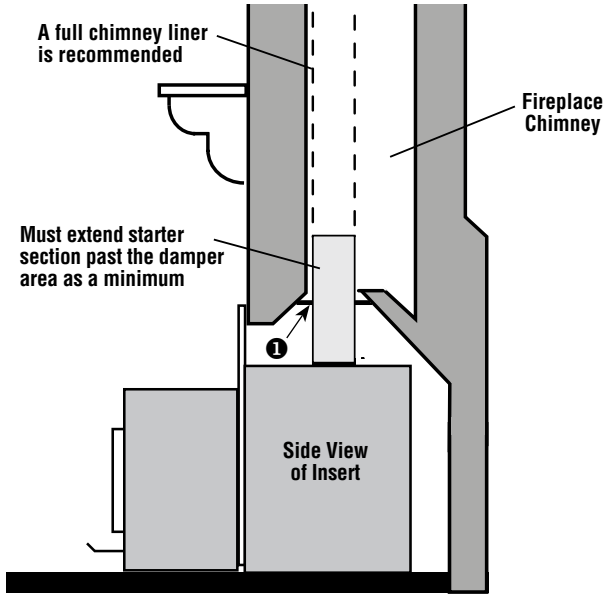
Required in Canada

See the following instructions for approved methods of achieving a positive flue connection - See *Figure 9.*

A qualified installer should evaluate the existing fireplace to determine the best method for achieving a positive flue connection between the vent pipe or liner and the existing fireplace chimney. The most common method for achieving a positive flue connection in masonry fireplaces is to secure a seal-off plate (i.e. 22-gage sheet steel) in the fireplace throat using masonry screws. Other acceptable methods include packing noncombustible material (i.e. high temp fiberglass or ceramic insulation) around the vent pipe or using a flue adapter. Whatever "seal off" method is used, it must effectively seal the area to prevent room air passage to the chimney cavity of the fireplace.

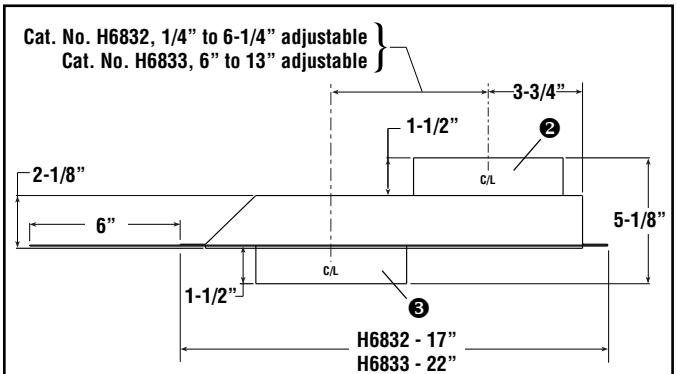
Offset Boxes

Offsets can be handled using an offset box (it aligns flue outlet of insert with the fireplace flue (see ***Figure 10***). Care should be used to ensure that this adjustable offset box is oriented so it does not angle down when positioned on the insert flue outlet (level or slightly up at the outbound end is recommended).

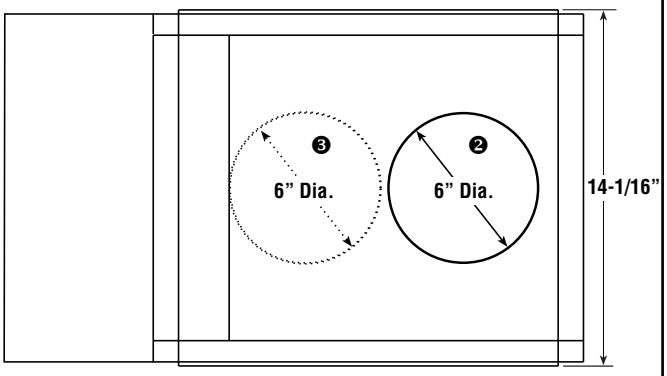


❶A non-combustible seal is required at the damper area (to prevent dilution air from entering the chimney). See *Direct Connect Positive Flue Connection* on this page. A seal-off plate method is shown here.

Figure 9 - Positive Flue Connection



SIDE VIEW



TOP VIEW

❷Top 6" collar attaches to rigid pipe or flex liner.

❸Bottom 6" collar attaches to connector ring on insert flue outlet.

Figure 10 - Offset Box Dimensions

NOTE: DIAGRAMS & ILLUSTRATIONS ARE NOT TO SCALE.

INSTALLATION PROCEDURE - FACTORY-BUILT ZERO CLEARANCE FIREPLACES

Fireplace and Chimney Requirements

This appliance must only be installed in a zero clearance factory-built fireplace using 6" (152mm) stainless steel pipe extending from the insert's flue into the chimney of the fireplace. **For optimum safety and performance** we recommend a full length stainless steel liner directly connected to the insert's flue outlet.

This appliance must only be installed in a zero clearance factory-built fireplace that is structurally sound. Fireboxes or chimneys that have flaws, burnouts, or warping must be replaced or repaired prior to installation. Check with your fireplace manufacturer if any problems exist.

All convection vents and louvers must be left unmodified and unobstructed.

This appliance can only be installed in the following brands of factory-built zero clearance fireplaces: **IHP, SUPERIOR, HEATILATOR, MAJESTIC, MARTIN, PREWAY, MARCO, TEMCO and FMI.**

The fireplace cavity must be 36" (914 mm) in width, 21" (533 mm) in height and 14" (356 mm) in depth. Installation in larger size fireboxes of the same brands is permissible.

Installations into other brands of the same size is permissible only with approval from local building officials.

Modifications allowed to the factory-built fireplace are as follows:

- Remove the damper
- Remove the smoke shelf or smoke baffle
- Remove ember catches
- Remove viewing screen/curtain
- Remove side and rear bricks
- Remove the fire grate
- Remove doors

The factory built chimney must be listed per UL 127 (US), and meet type HT requirements of UL 103 (US). Factory built fireplace chimneys tested to UL 127-1998, may be at the fireplace manufacturer's option, tested to the same criteria as UL 103 HT requirements. If the chimney is not listed as meeting HT requirements, or if the factory built fireplace was tested prior to 1998, a full height listed chimney liner must be installed from the appliance flue collar to the chimney top. The liner must meet type HT requirements (2100ºF) per UL 1777 (US). The liner must be securely attached to the insert flue collar and the chimney top. To prevent room air passage to the chimney cavity of the fireplace, seal either the damper area around the chimney liner with high temperature sealant or the fireplace front with fiberglass batting.

CLEARANCE TO COMBUSTIBLES

See "Required Clearances" on ***Page 8***.

FIREPLACE PRE-INSTALLATION PREPARATION

NOTE: IHP RECOMMENDS PROFESSIONAL INSTALLATION BY A LICENSED AND BONDED INSTALLER. SEE YOUR DEALER FOR RECOMMENDATIONS. IMPROPER INSTALLATION OR MIS-USE WILL VOID YOUR WARRANTY AND CREATE A SERIOUS SAFETY HAZARD.

Remove any doors or screen materials from the fireplace opening. Remove the damper mechanism completely. Also remove grates or ember catches inside the fireplace hearth. If your fireplace is equipped with a smoke shelf or baffle and if it interferes with the installation it may be removed. Side and rear refractory may also be removed, if necessary, to facilitate installation. No modifications shall be done unless allowed on the previous list. Retain all removed parts, they must be reinstalled before the fireplace can be used in it's original condition.

INSERT PRE-INSTALLATION PREPARATION

Install the two 3" (76 mm) long bolts (with the head up) through the nuts attached to the insert on the lower rear corner of each side. This will allow you to level the insert when placed into the fireplace.

Measure from the front of the top surround mount to the center of the flue. Determine if there is an alignment problem in connecting a liner from the chimney to the insert's flue. If there is an alignment problem, connection can be made using a short piece of stainless flex or a stainless steel offset box (available from your dealer). Before installing the liner, make any attachment brackets or drill any holes in the liner, offset box, or insert. Once installed, it may be difficult or impossible to drill additional holes.

FACTORY BUILT FIREPLACE WARNING TAG

The fireplace must not be altered, except for the exceptions listed below. The permanent metal warning label provided must be attached to the back of the fireplace, stating that the fireplace may have been altered to accommodate the insert, and must be returned to original condition for use as a conventional fireplace. The following modifications of factory built fireplaces are permissible: removal of damper, removal of smoke shelf or baffle, removal of ember catches, removal of fire grate, removal of viewing screen/curtain, and removal of doors.

NOTE: Secure the tag using screws or nails to the fireplace.

This fireplace has been altered to accommodate a fireplace insert and should be inspected by a qualified person prior to re-use as a conventional fireplace.

CHIMNEY LINER INSTALLATION

Remove the existing chimney cap and install a stainless steel liner into the chimney (if a special section has been used or drilled to attach to the insert, it must be the bottom piece). The next piece should be a dripless slip joint, followed by the rest of the chimney liner. Fasten the chimney at the top when it is positioned so that the slip joint will allow the lowest piece to slide up enough to clear the insert during installation. Insulate the top four to six feet between the liner and the chimney to prevent heat loss. Install the cap and flash if necessary to prevent water or creosote from entering the chimney's venting system.

From inside the fireplace firebox, attach any adaptors or flue offsets and slide the liner up as far as necessary for the bottom piece to clear the insert during installation.

In Canada, This fireplace insert must be installed with a continuous chimney liner of 6" diameter extending from the fireplace insert to the top of the chimney. The chimney liner must conform to the Class 3 requirements of CAN/ULC-S635, Standard for Lining Systems for Existing Masonry or Factory-Built Chimneys and Vents, or CAN/ULC S640, Standard for Lining Systems for New Masonry Chimneys.

INSTALLING THE INSERT

Place the insert into the fireplace, making sure to center it side to side. Slide the insert in until the surround mounts are approximately 1/2" (13 mm) from the face of the fireplace where the surround panels cover.

Lower the chimney and make attachment to the insert. Level the fireplace insert by using a 3/4" socket and a long extension and adjusting the bolts on either side of the insert.

Install the side surround panels with the screws supplied. Push the insert in until there is approximately a 1/4" (6 mm) gap between the back of the surround panels and the face of the fireplace. Before installing the top surround panel, make sure all connections are tight and that no part of the insert or chimney is touching the firebox or chimney in the fireplace. There must be a minimum of 1" (25mm) clearance between the fireplace insert and the zero clearance fireplace. Install the top surround panel.

If additional support is necessary, factory punched holes in the front corners of the bottom air chamber will accept leveling legs. Carefully measure the distance from the hearth protection to the bottom of the fireplace insert. Use 3/8" diameter bolts that are 1/2" (13 mm) longer than the distance just measured. Thread a nut onto the bolt approximately 1" (25 mm). Lift the fireplace insert slightly and insert a bolt into each hole and then thread the nut up the bolt until the front is securely supported. Install another nut onto the bolt through the air space in the fireplace insert and tighten securely. If desired an insert front support, Part# H5296, is available to fill the space between the insert and the hearth protection.

Install the brick and baffle as per ***Page 7***.

POST INSTALLATION CHECKS

1. Check that all chimney pipe joints are securely fastened.
2. Be sure all roof flashings are watertight (if applicable).

FOR YOUR OWN PROTECTION AND INSURANCE PURPOSES, HAVE YOUR CHIMNEY AND CONNECTOR PIPE INSTALLATION INSPECTED BY YOUR LOCAL BUILDING CODE AUTHORITY OR FIRE MARSHAL BEFORE STARTING A FIRE IN YOUR STOVE OR INSERT. NOTIFY YOUR INSURANCE COMPANY.

OPERATING HINTS

1. Burn only dry, well-seasoned wood for maximum heat output. In some states it is illegal to burn wet wood or anything other than clean, dry wood products.
2. Your stove or fireplace insert is designed to operate with the door closed! Operate only with the door shut tightly at all times except when loading wood and possibly on start up to establish a draft. Never leave the unit unattended while the front door is slightly opened.
3. **DO NOT** hit or move the baffle board while loading wood. Occasionally check the baffle. Make sure the baffle blankets are always flush with the front of the baffle boards. Loading oversized logs may dislodge the baffle boards.
4. **CAUTION: THE DRAFT CONTROL MUST BE FULLY OPEN BEFORE OPENING THE DOOR TO AVOID POSSIBLE COMBUSTION FLASH!!** (Ignition of hot volatile gases as the door is opened).
5. Feeding excessive amounts of fuel to the appliance should be avoided. It is important to supply it with sufficient draft and fuel to maintain a moderately hot fire. If, during overnight burns, heavy creosote deposits develop inside your stove or fireplace insert and on the door, the draft is set too low - review your burning habits!

⚠ WARNING

Be careful not to abuse door assembly by striking or slamming it. If the door assembly or glass is broken or damaged, they must be replaced with factory original parts before heater can be safely operated. Use only components provided by the manufacturer as replacement parts.

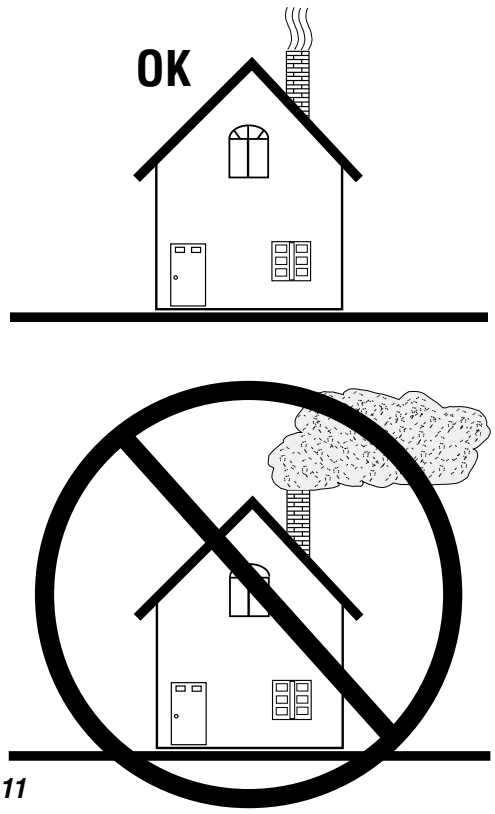


Figure 11

STARTING AND MAINTAINING A FIRE

Be sure to clean plated accessories with a household type cleaner and a very soft cloth to remove any fingerprints and residues prior to the first fire.

1. **NEVER USE FLAMMABLE LIQUIDS TO START OR REKINDLE A SOLID FUEL FIRE!!**
2. Fully open the primary draft control by pulling the 1" plastic knob out on the left side (lower front corner) until it stops (away from the fireplace insert). This control determines the amount of air entering the fireplace insert. Pushing it toward the fireplace insert reduces the burn rate in the firebox. For your convenience, the rod on this control is marked with four grooves to assist you in obtaining repeatable burn rates.
3. Place a small amount of crumpled paper in front of the firebox and cover it with a few pieces of kindling.
4. Light the paper and allow sufficient time for the kindling to become fully engulfed in flames. You will now close the wood units front door. (Your wood units front door may or may not need to be left slightly open during this start up process, this depends on the appliance model and the amount of draft present. Do not leave the unit unattended while the front door is slightly open) Once kindling is burning well, larger pieces of wood may be added, then the door should be fully closed if there was the need to keep it slightly open during start up.

   DO NOT LEAVE THE APPLIANCE UNATTENDED WHILE THE FRONT DOOR IS SLIGHTLY OPEN.

   CAUTION: Do Not alter the adjustment range of the draft control for increased firing for any reason.

   Operate only with fuel door and ash drawer closed. Maintain all seals in good condition. Do not operate with broken glass.

   Do Not build the fire too close to the glass.

   Do not operate the appliance with the door open or ajar other than possibly during start up to create a draft (Do not leave the unit unattended while the front door is slightly open during start up). Operating the appliance with the door open other then in initial start up if needed will produce extreme temperatures within the appliance. Damage caused from over-firing is not covered under the manufacturers limited warranty.
5. When operating any wood burning appliance, it is important to become familiar with how the damper control affects heat output and the overall temperature of the appliance. A stove thermometer can be a helpful tool to help ensure you are not over-firing your appliance and it will also ensure you are burning fuel at a rate that is most efficient. Place a stove thermometer on the top of the appliance. Monitor the temperature every 15 minutes or so until you become more familiar with your appliance. Close the damper all the way down if you begin to reach 600 degrees, as this is a sign that you are operating your appliance at too high a temperature.
6. For best results, use smaller pieces of wood to get the appliance temperature very high before loading larger wood for sustained burns. If necessary, crack the door to allow ignition of the fuel charge. Do not leave the unit unattended while the front door is slightly open. Now you can add larger pieces of wood and after several minutes of high burn, set the left control for the desired heat output. Check the exhaust in about 15 to 20 minutes. Large amounts of smoke indicate an improper burn setting (either too high or too low). Adjust and recheck in 5 to 10 minutes.

NOTE: DIAGRAMS & ILLUSTRATIONS ARE NOT TO SCALE.

BLOWER OPERATION

Blower Operation

The blower can be operated manually or automatically (blower will turn on when the stove or insert is hot and turn off when the stove or insert is cool).

The rocker switch on the control panel allows you to select between manual operation or automatic operation as follows (see ***Figure 10***):

MANUAL OPERATION: Turn rocker switch to the manual position (up) and adjust rheostat knob to the desired speed. The blower will have to be manually turned "OFF" by rotating the rheostat knob counterclockwise until it clicks.

AUTO OPERATION: Turn rocker switch to the "AUTO" position and the rheostat to the ON position (rotate rheostat knob clockwise until it clicks). When the stove or insert warms up, the blower will automatically turn on (adjust rheostat knob to the desired speed setting). When the stove or insert cools down, the blower will automatically turn off.

Rheostat Operation - The highest blower speed is obtained by turning the rheostat knob clockwise until it clicks "ON", then rotate towards "HIGH" to increase blower speed. Rotate the knob clockwise for a lower speed. To turn off, continue to rotate the knob counterclockwise until it clicks "OFF."

Blower Operation Guidelines

While in auto operation mode, the blower will turn off and on based on the temperature of the appliance. Auto operation ensures there is sufficient heat build-up to warm the air being moved by the blower before the blower is turned on. Likewise, when the appliance cools off, the blower is turned off to prevent circulating cool air. Depending on the size and intensity of the fire it may be necessary to adjust the blower speed accordingly to ensure uninterrupted blower operation. For example a small fire may require a slower blower speed to keep the heat output by the blower consistent. If the blower is operated in manual mode, it may be necessary to adjust the blower speed as the fire begins to burn down and the appliance is no longer hot enough to effectively heat the air moved by the blower. If the air coming from the blower feels cool, one should either decrease the blower speed or stoke the fire to build up more heat.

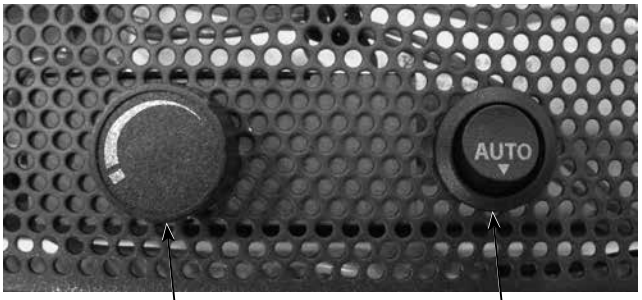


Figure 11 - Blower Controls

⚠ WARNING

The blower must be plugged directly into a properly grounded three-prong receptacle, 120 VAC, 60 Hz, single phase. Do not cut or remove the grounding prong from this plug. Do not route power cord under or in front of appliance.

Installation must be in accordance with National Electrical Code, ANSI/NFPA 70 - latest edition. In Canada, the current CSA C22.1 Canadian Electrical Code - latest edition.

DANGER: Disconnect power before servicing blower.

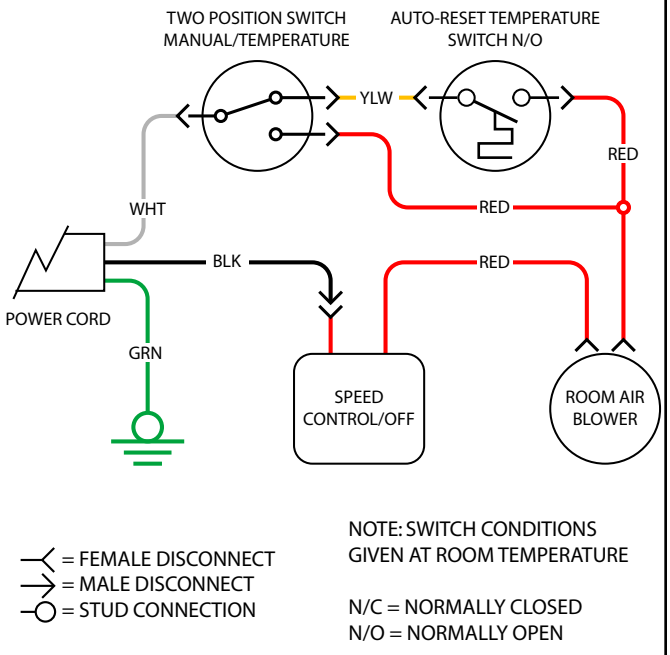


Figure 12 - Blower Wiring Schematic

OPERATING TECHNIQUES AND HINTS

Recent developments in wood-burning technology have made wood-burning a cleaner and more convenient way to heat your home. Overall efficiency in a wood-burning appliance is a combination of combustion efficiency and heat transfer efficiency. Whether heating your entire home or just a room or two, your understanding of how to best operate your stove or insert will enhance its overall efficiency and performance. What this can mean to you is longer, cleaner burns, less wood use and more heat.

GETTING THE MOST OUT OF YOUR APPLIANCE

The following sections will outline techniques you can use to "get the most out of Your appliance." Please read them carefully.

MAXIMIZING YOUR APPLIANCE'S OVERALL EFFICIENCY

It is important to know that for high, combustion efficient, clean burns, you will need to have sufficient temperatures inside the firebox for thorough combustion. The best method for determining if you have sufficient temperatures is to watch the brick lining in your firebox. When you first light your stove or fireplace insert, the firebrick will turn a dark brown or black. After 20 to 30 minutes of a hot fire, most of the bricks should return to near their original light brown or yellow color. This means the firebrick have reached a high enough temperature for Your appliance to achieve high combustion efficiency.

Second and just as important, is achieving a high level of heat transfer efficiency. Slowing the rate of flow through the stove or insert enhances heat transfer, thus allowing more time for heat to be transferred into your home. To do this, be sure to thoroughly preheat Your appliance and then reduce the amount of primary air by closing the draft control (lower left) to about 1/2 to 3/4 open. This will decrease the excess oxygen in your flue, which carries heat up your chimney, but should still be enough air to allow the fireplace insert to produce its maximum heat output. (More air may produce a lightly greater amount of heat, but will greatly increase wood consumption). When the area being heated reaches a comfortable temperature, slow the burn rate by closing the control to further improve heat transfer.

To get the most out of Your appliance, you will need to combine good combustion efficiency with good heat transfer practices. The following are some tips on how to operate Your appliance to achieve the highest overall efficiency.

1. Thoroughly preheat Your appliance before slowing the burn rate by closing the draft control.
2. Measure the fireplace insert temperature at the hottest point on the fireplace insert top or face. Use this information to repeat burn rates.
3. Once preheated, add wood (if needed) and partially close the draft control (lower left).
4. Operate your stove or fireplace insert as much as possible in the low to medium burn ranges.
5. Do not lower the draft setting so low as to completely extinguish the flames in the firebox. Check for at least some small flames 20 minutes after setting the draft control.
6. Do not continually operate your stove or fireplace insert in the high (wide open) setting. This wastes wood by carrying a great deal of heat up the chimney and can damage your stove or fireplace insert and chimney.
7. Go outside and check your chimney. More than a very small amount of smoke indicates wasted heat, creosote build up and pollution.

ACHIEVING CLEAN, LONG BURNS

To achieve long burn times, after having thoroughly preheated the appliance, let the appliance top cool down to 275 to 400 degrees (on Elite inserts, locate thermometer on the face of the insert just above the door). Now load the firebox and set the draft control. At this point, you may need to burn the fireplace insert with the draft open for a few minutes to ignite the wood. All IHP stoves and inserts are EPA tested for emissions at low burn with the air control completely closed. Whether or not you should burn Your appliance with the air control completely closed will depend on the following factors:

- How you load your wood
- Your chimney type, height and draft
- Your wood type and its moisture content
- The temperature of the appliance or fireplace insert
- Which model stove or insert you have

Experiment with different loading configurations to achieve longer burns. Try loading the wood from side to side and nesting it in the ashes to prevent airflow under and around the wood. Fresh wood should be loaded to the back of the firebox or to the sides. Hot coals or half burned wood should be brought toward the front of the firebox. The way you load your wood can seriously affect burn times. If the new load does not ignite within a few minutes, try crisscrossing the load to allow more airflow around the fire, or try a slightly hotter fireplace insert temperature.

Determining the lowest setting for efficient low burns. This will require some experimentation on your part. Try closing the air control all the way with the fireplace insert temperature at 325 to 350 degrees. If the flames are completely extinguished, open the air control halfway and then slowly close it until there is only a small amount of flame. It is important to check the fireplace insert about 20 minutes after setting the draft control as it takes this long for the fireplace insert temperature to stabilize. There should still be some small flames on or above the wood load.

Use 325 degrees as a starting point. You can try starting temperatures 25 degrees higher or lower to achieve desired burn times, start 25 degrees lower if the fireplace insert burns the wood too quickly or 25 degrees higher if there are no flames in the firebox for more than a few minutes after loading the wood. You may or may not need to burn the fireplace insert with the air control open for a few minutes prior to setting the draft for a low burn, this will depend on the factors mentioned above. **Be sure not to smolder a fire overnight. Check your chimney for large amounts of smoke as this indicates very poor combustion.**

It is important to realize that stove technology has changed. Stoves and fireplace inserts have changed a great deal in the last few years. This has led to substantial changes in the methods of operation in new stoves as compared to older stoves. In old stoves without full brick linings and ceramic insulation, the rule was "get the stove as hot as possible before setting the draft on low for overnight burns." On newer, high technology IHP stoves, this is not necessary. Although it is still important to have the stove hot enough to burn efficiently, it will require less preheating. Once you have determined your optimum operating temperatures for various burn rates, we believe you will find your stove or fireplace insert an extremely convenient way to achieve your heating needs.

Do not reload the fireplace insert for long burns when the stainless secondary tubes or baffles are glowing red, or when the fireplace insert is uncomfortably hot to load. This indicates the fireplace insert is too hot to load for a long burn. Also, do not load wood for a long burn on a deep bed of hot coals. Try stirring the coals a few minutes before loading the fireplace insert for a low burn to allow some of the unburned coals time to burn.

MAINTENANCE

Have your product inspected at least once a year by a qualified service technician to ensure gaskets, air tubes, baffles, and venting are in good repair to ensure proper performance. Have degraded items replaced by a qualified service technician.

THIS WOOD HEATER NEEDS PERIODIC INSPECTION AND REPAIR FOR PROPER OPERATION. IT IS AGAINST FEDERAL REGULATIONS TO OPERATE THIS WOOD HEATER IN A MANNER INCONSISTENT WITH OPERATING INSTRUCTIONS IN THIS MANUAL.

DOOR HINGES: If door hinges need lubricating, use an anti-seize compound (never use oil) available from your IHP dealer.

DOOR LATCH: If your door latch fails to latch tightly and the gasket is in good condition, place a length of pipe (cheater bar) over the inside portion of the door handle and bend slightly toward the door until the proper

adjustment is obtained. If the door handle does not close easily, apply high temperature anti-seize to the striker.

DOOR GASKET: Periodically check gasket to make sure it is not overcompressed. If compressed, replace with a special woven door rope. (Don't try substituting rope, only use special IHP door rope).

PLATED ACCESSORIES: Clean only with a household type glass cleaner and a very soft cotton cloth Other products may damage plated finish, paint and gaskets.

BAFFLE BLANKETS: Your baffle blankets should be inspected during every chimney cleaning. If the blanket is compressed or heavily stained, it should be replaced. Heavy creosote stains or matting is an indication of improper use and your burning habits should be reviewed.

GLASS CLEANING: Only clean glass with products specifically made to use on wood stoves and fireplace inserts. Other products could damage gaskets and paint. Never scrape glass with a razor blade. This can pit the glass and make it impossible to clean in the future.

WINDOW GASKET: The window gasket can be checked by running the flame of the match near the gasket and around the door. If the flame is drawn in around the window, the gasket should be replaced.

DOOR HANDLE: Door handle may become tight as you use the fireplace insert. Free the handle up by using dry graphite supplied with the fireplace insert. The directions are included with the graphite.

⚠ WARNING

Inspect and clean chimney and connector frequently. Under certain conditions of use, creosote buildup may occur rapidly. See *Installing the Insert* on *Page 13* for instructions on removing the appliance for cleaning (reverse order of instructions).

GLASS CLEANING GUIDELINES

WARNING: DO NOT CLEAN GLASS WHEN APPLIANCE IS HOT!

Glass on any wood stove or fireplace insert will not stay perfectly clean. Here are some guidelines for cleaning and caring for the glass:

- Ensure the appliance is cold prior to cleaning glass.
- This appliance is designed to provide a flow of air over the inside of the glass, where along with high heat helps inhibit build-up on the glass. When build-up occurs, a commercial glass cleaner designed for stoves is recommended. Regular household glass cleaners will not clean creosote.
- Do not use abrasives such as steel pads, steel wool or oven cleaner as they will scratch the glass. Never scrape glass with a razor blade as this may pit the glass and make it impossible to clean in the future.
- Do not use chemical glass cleaners as they may damage the gaskets or painted surfaces.

TIPS FOR KEEPING THE GLASS CLEAN

- Burn only dry seasoned cord wood. Wet wood = Dirty glass.
- A short, hot fire (15 - 20 minutes) may help to clean off some of the normal buildup. Lower burns = more build-up. Higher burns = less build-up.
- Keep freshly loaded wood away from the glass.
- After reloading, allow all the wood to catch flame before dampering down the appliance.

⚠ CAUTION

Cleaning Glass: Ensure appliance is cold prior to cleaning glass. A commercial glass cleaner designed for stoves is recommended. Do not use abrasive cleaners. Do not clean with any materials, which may scratch or otherwise damage the glass. Scratches on the glass can develop into cracks or break. Inspect the glass regularly. If you detect a crack, extinguish the fire and contact your dealer for a replacement.

GLASS REPLACEMENT INSTRUCTIONS

Step 1. Remove Door Assembly - Open door to remove E clip from the upper hinge pin. Remove upper hinge pin by pulling up while holding the opposite side of the door. Lift door out of the lower hinge pin and place face down on a soft surface.

Step 2. Remove Door Back Screws (6 ea.) - Using a 5/32" allen wrench remove the 6 retainer screws from the faceplate. To locate screws, peel back the door gasket as necessary.

Step 3. Disassemble Door Assembly - Flip door assembly over to be face up. Separate faceplate from door back by pulling up on faceplate.

Step 4. Remove Glass - Carefully remove broken glass one piece at a time (protective gloves are recommended)

Step 5. Install New Glass Assembly - Install the new glass with gasket in recess on door back (use only factory supplied 5mm ceramic glass. Do not substitute).

Step 6. Reinstall Faceplate and Screws - Reinstall faceplate onto door back and while holding the door assembly together flip the assembly back onto it's face. Carefully reinstall the screws. Be very careful not to overtighten the screws (this could result in glass breakage when the appliance is hot) and it is highly recommended to use anti seize on the screws.

Step 7. Reinstall Door - Set door assembly back into the lower hinge mount while holding the handle side of the door up. Place the upper hinge pin back in the mount and door assembly. Reinstall the E clip that was removed.

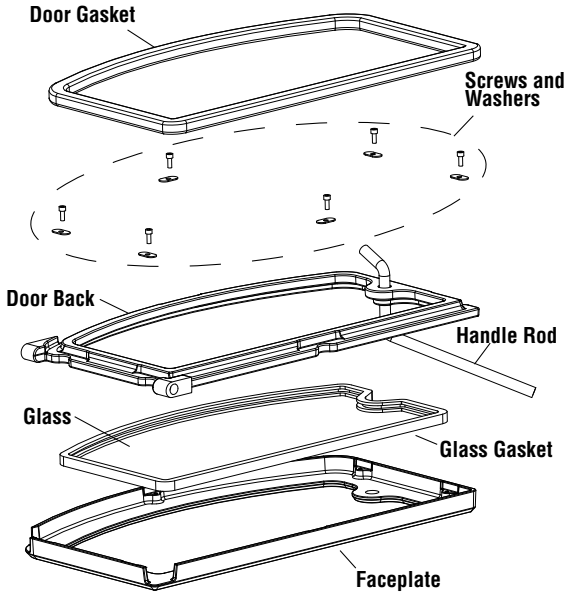


Figure 20

TROUBLESHOOTING

Problem	Solution
POOR DRAFT:	Extend chimney in length or have the chimney realigned to the proper size flue. Oversized chimneys normally have poor drafts. Remember, the appliances' draft depends solely on the natural draft of the chimney (See Draft Requirements on ***Page 4***). If your stove or fireplace insert is not drafting properly, your chimney is the problem. All stoves and fireplace inserts are thoroughly tested to ensure proper draft with the correct size chimney flue.
EXCESSIVE DRAFT:	With better chimneys being more common, excessive draft can be an issue. Alleviate excessive draft by slowing the burn rate of the appliance once it has reached proper operating temperature (See Maximizing Your appliances Overall Efficiency on ***Page 16***).
DIRTY GLASS:	1) Burn smaller, hotter fires and check to make sure you are not setting the draft down too far with the draft control. 2) Make sure your wood is well seasoned and dry (not open to rain - see Creosote and Fuel sections on ***Pages 5-6***). 3) See Poor Draft section (above) and Clean Glass (above).
SMOKES WHEN DOOR IS OPEN:	1) If smoke is entering the room, check to make sure your baffle boards are properly installed and that the baffle blankets are pushed back flush with the front of the baffle boards. 2) Check the chimney for blockage due to creosote (see Creosote section on ***Page 5***). 3) Check draft (See POOR DRAFT section above).
WOOD BURNS TOO FAST:	1) The draft control must be closed further. 2) Add fuel at lower firebox temperatures. 3) Load wood side to side and reduce the flow of air under wood. 4) The door seal may need replacing, check for leakage. 5) See "Excessive Draft."
POOR HEAT OUTPUT:	1) Check your wood. Wet, moist, unseasoned wood will not produce heat. 2) Your stove or fireplace insert needs to be seasoned (moisture removed from the steel and brick). Continue to burn a fire. It normally takes from one to three weeks of burning to season your stove or fireplace insert (See Burn-In Period on ***Page 6***). 3) See Excessive Draft section above.
PAINT GIVES OFF ODOR (smoke):	Paint is tempering-in. Burn only moderately hot for the first few days until paint is fully cured. Then burn a very hot fire to cure any paint that may not easily cure. Open windows or door to ventilate (See Burn-In Period on ***Page 6***).

DO'S AND DON'TS

DO NOT: Install or operate the appliance before reading this manual.

DO NOT: Close the draft beyond the point at which the flames are completely extinguished.

DO NOT: Open the appliance door without fully opening the draft first.

DO NOT: Burn driftwood or wood that has been in salt water. This includes some mill ends and scrap lumber that has been floated in salt water on the way to the mill. (This will void your warranty).

DO NOT: Handle the plated faceplate unnecessarily. Use the door handle only.

DO NOT: Force oversized logs into the firebox as this may dislodge the baffle assembly.

DO NOT: Close the door tightly during Burn-In period.

DO: Be sure to clean any fingerprints from optional accessories that have plated surfaces before burning the appliance. Clean the plated surfaces only with household type glass cleaner and a very soft cloth.

DO: Consult local building department if other than recommended clearances are desired.

DO: Read instructions for the baffle boards and baffle blankets occasionally to ensure you have not bumped or moved them out of place when loading wood.

DO: Check the chimney and baffle monthly to make sure they are clean.

DO: Burn seasoned, dry wood only! (RAIN = WET WOOD)

DO: Open the door frequently during Burn-In period to keep gasket from adhering to the curing paint.

DO: Enjoy the warm feeling of your new IHP appliance.

Smoke Detector Recommended

Since there are always several potential sources of fire in any home, we recommend installing smoke detectors. If possible, install the smoke detector in a hallway adjacent to the room (to reduce the possibility of occasional false activation from the heat produced by these appliances). If your local code requires a smoke detector be installed within the same room, you must follow the requirements of your local code. Check with your local building department for requirements in your area.

Carbon Monoxide Monitor Recommended

Carbon Monoxide Poisoning: Early signs of carbon monoxide poisoning are similar to the flu with headaches, dizziness and/or nausea. If you have these signs, obtain fresh air immediately. Some people are more affected by carbon monoxide than others, including pregnant women, people with heart or lung disease or anemia, those under the influence of alcohol, and those at high altitudes.

It is against federal regulations to operate wood heaters in a manner inconsistent with operating instructions in the manual.

PROHIBITED FUELS

This heater is designed to burn natural wood only. Higher efficiencies and lower emissions generally result when burning air dried seasoned hardwoods, as compared to softwoods or to green or freshly cut hardwoods. DO NOT BURN:

- Garbage;
- Lawn clippings or yard waste;
- Materials containing rubber, including tires;
- Materials containing plastic;
- Waste petroleum products, paints or paint thinners, or asphalt products;
- Materials containing asbestos;
- Construction or demolition debris;
- Railroad ties or pressure-treated wood;
- Manure or animal remains;
- Salt water driftwood or other previously salt water saturated materials;
- Unseasoned wood;
- Christmas tree branches;
- Paper products, colored paper, cardboard, plywood, or particleboard;
- gasoline;
- naphtha;
- engine oil;
- flammable liquids;
- solvents;
- grease; or
- coal

The prohibition against burning these materials does not prohibit the use of fire starters made from paper, cardboard, saw dust, wax and similar substances for the purpose of starting a fire in an affected wood heater.

Burning these materials may result in release of toxic fumes or render the heater ineffective and cause smoke. Intense firing with these materials may overheat the fireplace, causing damage to the unit, a fire or even possibly igniting a chimney fire if the chimney is creosoted. Burning unapproved fuel, resulting in excessive pollutants being emitted, may be prohibited and subject to a fine or other penalty by the authority having jurisdiction in your area.

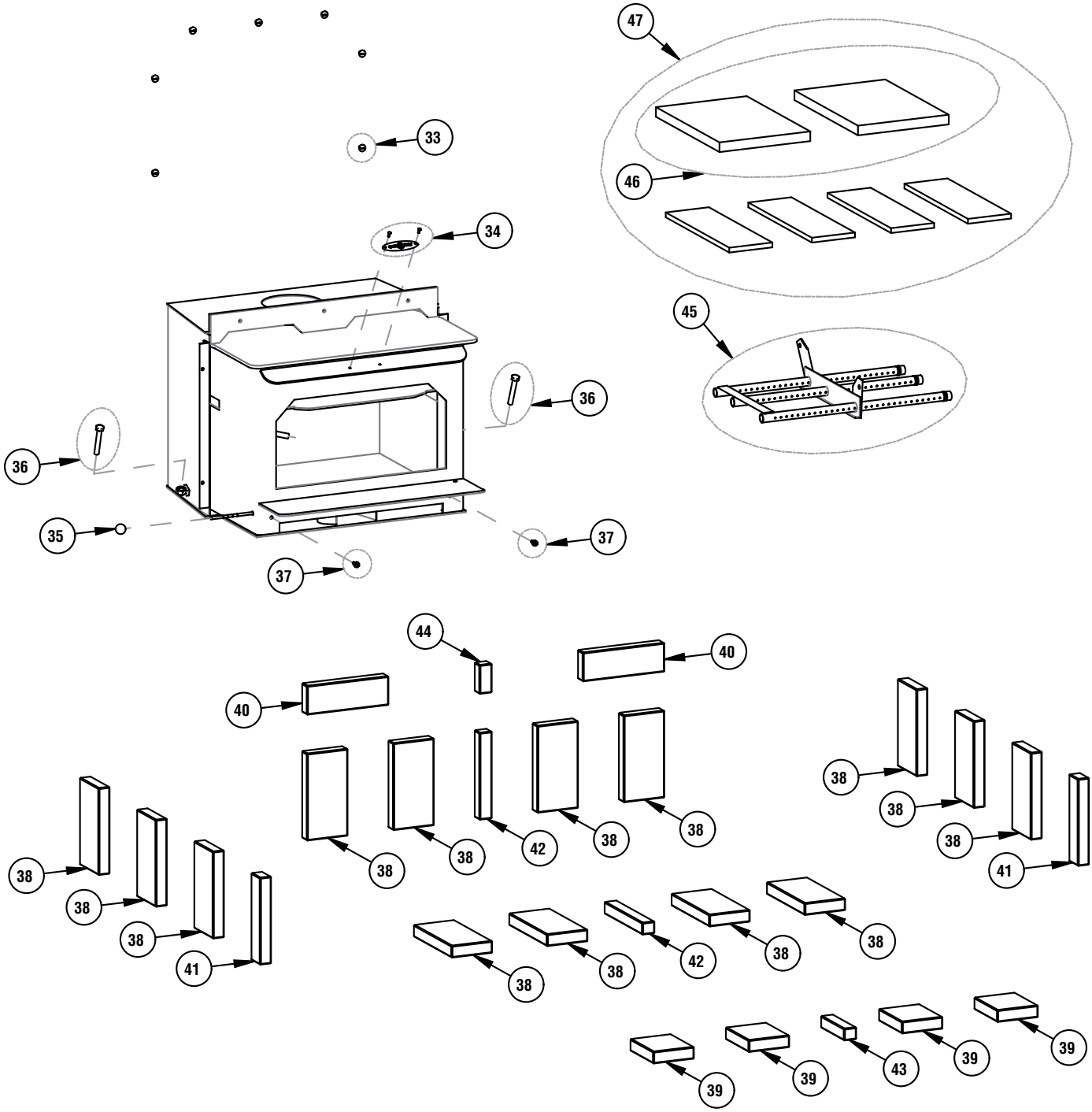
REPLACEMENT PARTS - MODEL C210TGL AND C210AGL

Contact an IHP dealer to obtain any of these parts. Never use substitute materials. Use of non-approved parts can result in poor performance and safety hazards.

FRONT DOOR PARTS LIST		
Item #	Cat. No.	Description
1	H5639	Door Rope Kit, 7/8" Dia. (6' 2")
2	H5629	Upper Hinge Pin
3	H5625	Upper Hinge Pin E-Clip
4	H5628	Lower Hinge Pin
5	H5646	Lower Hinge Pin Copper Washer
6	H5640	Glass Gasket Kit (8' 4")
7	H5577	Set of 6 screws and 6 washers for door assembly
8	H5654	Spring Handle / Nickel
	H5653	Spring Handle / Gold
9	71067	Traditional Door Glass / Plain
	71068	Traditional Door Glass / Sailboat
	71063	Traditional Door Glass / Cattail
	71065	Traditional Door Glass / Evergreen
	71066	Traditional Door Glass / Floral
10	71057	Traditional Door Faceplate / Black
	71058	Traditional Door Faceplate / Gold
	71059	Traditional Door Faceplate / Nickel
	71148	Traditional Door Faceplate / Brushed Gold
	71145	Traditional Door Faceplate / Brushed Nickel
11	71072	Arch Door Glass / Plain
	71073	Arch Door Glass / Sailboat
	71069	Arch Door Glass / Cattail
	71070	Arch Door Glass / Evergreen
	71071	Arch Door Glass / Floral
12	71060	Arch Door Faceplate / Black
	71061	Arch Door Faceplate / Gold
	71062	Arch Door Faceplate / Nickel
	71147	Arch Door Faceplate / Brushed Gold
	71144	Arch Door Faceplate / Brushed Nickel
13	H5579	Traditional Door Back w/ Handle (door gasket included)
14	H5578	Arch Door Back w/ Handle (door gasket included)

USB BLOWER PARTS		
15	H8067	UHPII Wiring Harness
16	H5655	UHPI & UHPII Blower Speed Control
17	H8068	Snap Switch Bracket w/ hardware
18	H8082	Replacement Power Cord
19	H8074	UHPII Blower Cage-Snap Switch/ Black
	H8075	UHPII Blower Cage-Snap Switch/ Gold
	H8076	UHPII Blower Cage-Snap Switch/ Nickel
	H8077	UHPII Blower Cage-Snap Switch/ Brushed Gold
	H8078	UHPII Blower Cage-Snap Switch/ Brushed Nickel
29	H8064	Snap Switch w/ Gasket and Hardware
32	H8066	Control Switch (Manual, Off, Automatic)
C210GL INSERT PARTS		
33	71139	Large Flange Screw/ Black - Seven Needed
	H5295	Large Flange Screw/ Nickel - Seven Needed
34	F1871	IronStrike® Nameplate Kit w/ Hardware - Nickel
	F1872	IronStrike Nameplate Kit w/ Hardware - Gold
35	H5650	Draft Rod Knob
36	H5645	Side Leveling Bolts - Two Included
37	H5644	Blower Mounting Bolts - Two Needed
38	H5612	Firebrick 4-1/2" x 9" (14 per stove)
39	H5606	Firebrick 4-1/2" x 5-1/2" (4 per stove)
40	H5605	Firebrick 3" x 9" (2 per stove)
41	H5611	Firebrick 2-1/8" x 9" (2 per stove)
42	H5599	Firebrick 1-1/2" x 9" (2 per stove)
43	H3096	Firebrick 1-1/2" x 5-1/2" (1 per stove)
44	H5603	Firebrick 1-1/2" x 3" (1 per stove)
45	H5571	Complete Baffle/Secondary Burn Tube Assembly (includes tubes and all mounting hardware)
46	H8019	Baffle Blankets 15-1/4" x 12-1/2" x 1" - Two Included
47	H8018	Baffle Board Kit w/ Baffle Blankets
MISCELLANEOUS PARTS		
	71052	Dry Graphite (Apply to door handle and door hinges)
	H5633	Anti Seize 2 gram pouch

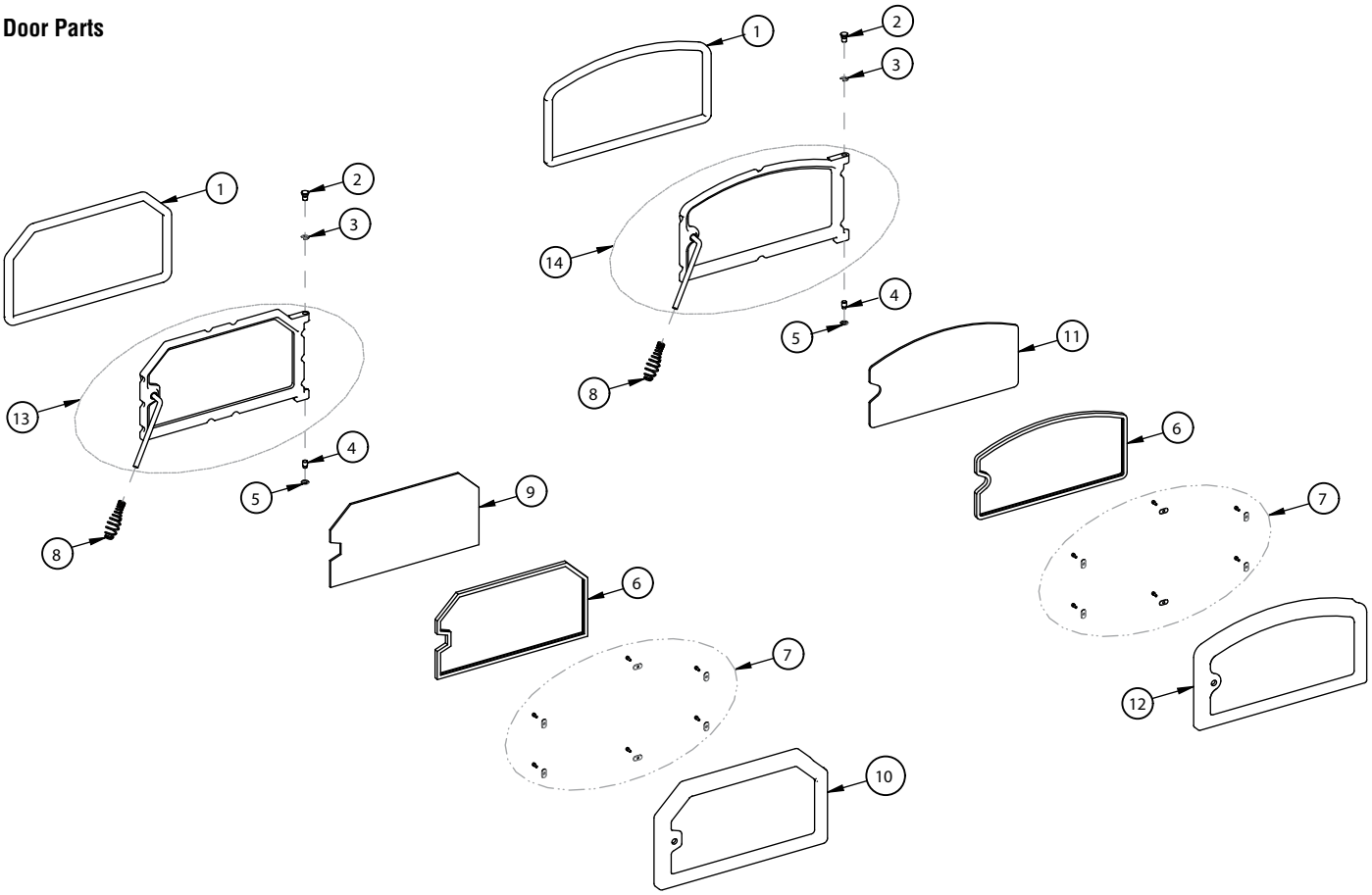
REPLACEMENT PARTS - MODEL C210TGL AND C210AGL



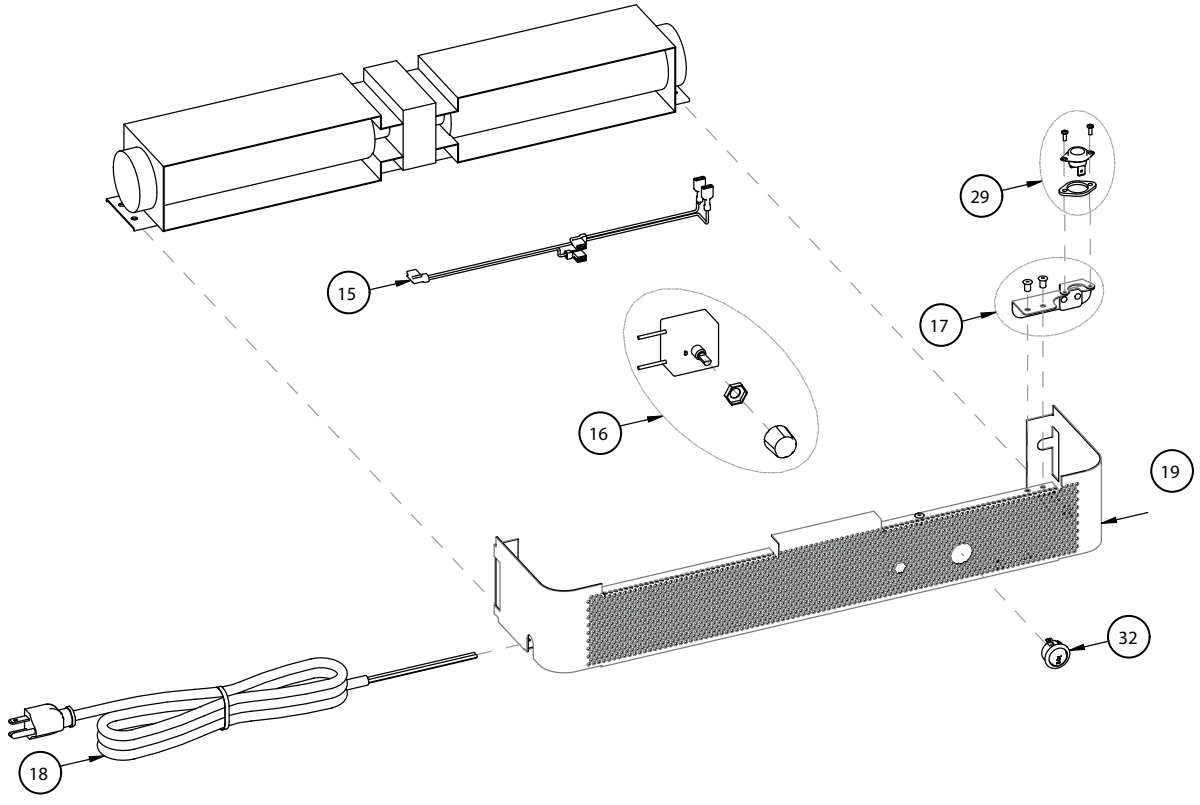
NOTE: DIAGRAMS & ILLUSTRATIONS ARE NOT TO SCALE.

REPLACEMENT PARTS - MODEL C210TGL AND C210AGL

Door Parts



Blower Parts



NOTE: DIAGRAMS & ILLUSTRATIONS ARE NOT TO SCALE.

ACCESSORIES - MODELS C210TGL AND C210AGL

Product Reference Information			
Cat. No.	Description	Ship. Weight	Ship. Volume
TBD	C210TGL, Insert / Traditional Black Door / Nickel Nameplate	427 lb.	18.30 cu. ft.
TBD	C210AGL, Insert / Arch Black Door / Nickel Nameplate	426 lb.	18.35 cu. ft.

SURROUND PANELS / TOP AND SIDES (REQUIRED)		
Cat. No.	Model	Description
		26-1/2" x 40":
71038	WFPT0740-L	Top Surround 7-1/2" x 40"
71033	WFPS0718	Side Surrounds 7-1/2" x 18-3/4"
		26-1/2" x 48":
71039	WFPT0748-L	Top Surround 7-1/2" x 48"
71034	WFPS1118	Side Surrounds 11-1/2" x 18-3/4"
		30-1/2" x 40":
71040	WFPT1140-L	Top Surround 11-1/2" x 40"
71033	WFPS0718	Side Surrounds 7-1/2" x 18-3/4"
		30-1/2" x 48":
71041	WFPT1148-L	Top Surround 11-1/2" x 48"
71034	WFPS1118	Side Surrounds 11-1/2" x 18-3/4"
SURROUND TRIM - THESE ARE NOT REQUIRED BUT AN OPTION		
71021	WFT2640-B	Black 26-3/4" x 40"
71022	WFT2648-B	Black 26-3/4" x 48"
71025	WFT3040-B	Black 30-3/4" x 40"
71026	WFT3048-B	Black 30-3/4" x 48"
71074	WFT2640-N	Nickel 26-3/4" x 40"
71075	WFT2648-N	Nickel 26-3/4" x 48"
71078	WFT3040-N	Nickel 30-3/4" x 40"
71079	WFT2948-N	Nickel 30-3/4" x 48"

BLOWERS		
Cat. No.	Model	Description
H7907	WSINS-BLWR-B-SS	Blower Insert Black
H7909	WSINS-BLWR-N-SS	Blower Insert Nickle
H7910	WSINS-BLWR-BN-SS	Blower Insert Br-nkl
MISC. PARTS		
H8159	TSPK-B	Touch-Up Paint , Metallic Black, 12 oz. Aerosol
H5296	FRNT-SPPT	Front Support 40"- 48" Width / 8"-0" Height *(ref. form #775305M)*
H6832	OFFADJFLUEBX6SM	Adjustable Offset Flue Box, 6" Flue to 6" Exhaust (0-6")
H6833	OFFADJFLUEBX6LG	Adjustable Offset Flue Box, 6" Flue to 6" Exhaust (6-12")
71161	WINS-6FC	6" Positive Flue Connector Ring Kit *(ref. form #775232M)*

SAFETY / LISTING LABEL - MODELS C210TGL AND C210AGL

CONTACT YOUR LOCAL BUILDING OR FIRE OFFICIALS ABOUT RESTRICTIONS AND INSTALLATION INSPECTION IN YOUR AREA
COMMUNIQUEZ AVEC LES AUTORITÉS LOCALES EN BÂTIMENT OU LE SERVICE DE PRÉVENTION DES INCENDIES POUR CONNAÎTRE LES NORMES D'INSTALLATION ET D'INSPECTION DE VOTRE RÉGION

Listed Factory-built or Masonry Fireplace Accessory/Insert / Poêle encastrable certifié pour installation dans un foyer de maçonnerie ou préfabriqué

IRONSTRIKE® HEAT FOR LIFE

Manufactured By / Fabriqué Par:
INNOVATIVE HEARTH PRODUCTS
1502 14th St NW
Auburn, WA 98001 USA

PFS C US

"PREVENT HOUSE FIRES"

Install and use only in accordance with manufacturer's installation instructions and your local building codes. Do not connect this unit to a chimney flue serving another appliance.

Optional Blower, Part No.s: H7907 (black), H7909 (nickel), H7910 (brushed nickel)
Blower Electrical Rating: 120V, 60 Hz, 1 Amp
Do not route power cord under or in front of appliance.

Report No./Numéro de Rapport: 14-185

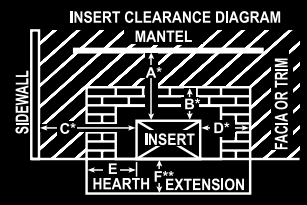
Serial No.
Numéro de série **C210GL-**

Model / Modèle: Performer™ C210TGL ☐
Performer C210AGL ☐

Tested to/Testé selon: UL 1482, ULC S628

This wood heater needs periodic inspection and repair for proper operation. Consult the owner's manual for further information. It is against federal regulations to operate this wood heater in a manner inconsistent with the operating instructions in the owner's manual.
Certification test emission value 1.55 grams/hr per 2020 cordwood standard

Minimum Clearance to Combustible Materials - Inches (millimeters)



(A) Clearance from Insert top to Mantel = USA-24", CAN-32" (813mm). Maximum mantel depth = 9"
(B) Clearance from insert top to combustible = USA -18" CAN-26" (660mm)
(C) Minimum clearance to combustible sidewall = 18" (450mm)
(D) Minimum clearance to combustible side trim = 15" (381mm)
(E) Minimum distance of floor protection to the side = 8" (200mm). This is measured from the sides of the door opening in the USA and from the sides of the insert in Canada.
(F) Minimum distance from front of insert to combustible = 18" (450mm)

The hearth and/or floor protection must be a thermally rated non-combustible hearth/floor protector meeting or exceeding a thermal rating of k=.84 or equivalent with a listed thickness of 3/8" (9.5mm) minimum in USA (3/4" - 19mm minimum in Canada). Install only in a masonry fireplace, built to UBC Chapter 37 or approved factory-built fireplace (USA only - see owner's manual). Do not remove brick or mortar from masonry fireplace to accommodate insert. Use flue outlet with or without a direct connector. Approved with minimum 6" (152mm) diameter stainless steel listed reline system. Remove and clean behind unit frequently, as creosote build up may occur rapidly. See owner's manual for reductions on mantel, trim and floor protection.
* Reduced clearances may be available for A, B, C, and D dimensions by using optional mantel and/or side shields. Consult with your Innovative Hearth Products dealer for the dimensions of the shields.
** Hearth extension reductions: 2" (51mm) reduction for 2" (51mm) raised hearth. 16" (406mm) minimum hearth extension on all inserts as measured from the door opening of the unit.

CAUTION: HOT WHILE IN OPERATION. DO NOT TOUCH, KEEP CHILDREN, CLOTHING AND FURNITURE AWAY. CONTACT MAY CAUSE SKIN BURNS. SEE NAME-PLATE AND INSTRUCTIONS. DO NOT OVERFIRE - IF HEATER OR CHIMNEY CONNECTOR GLOWS, YOU ARE OVERFIRING. INSPECT AND CLEAN CHIMNEY FREQUENTLY - UNDER CERTAIN CONDITIONS OF USE, CREOSOTE BUILDUP MAY OCCUR RAPIDLY. DO NOT USE GRATE OR ELEVATE FIRE - BUILD WOOD FIRE DIRECTLY ON HEARTH. FEED DOOR MUST BE CLOSED DURING FIRING EXCEPT WHEN ADDING FUEL. KEEP ASH DOOR CLOSED TO AVOID EXCESS HEAT. DANGER: RISK OF ELECTRICAL SHOCK. DISCONNECT POWER BEFORE SERVICING UNIT. FOR USE WITH SOLID WOOD FUEL ONLY.

Date of Manufacture / Date De Fabrication

2019	2020	2021	JAN. JANV	FEB. FEVR	MAR. MARS	APR AVR	MAY MAI	JUN JUIN	JUL JUIL	AUG AOÛT	SEP SEPT	OCT OCT	NOV NOV	DEC DEC
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U.S. ENVIRONMENTAL PROTECTION AGENCY
Certified to comply with 2020 cordwood standard.

Part No./ No. pièce #900980-03 Rev. 0, 04/2019 DO NOT REMOVE THIS LABEL Made in U.S.A.

"PREVENTION DES INCENDIES"

Installer et utiliser l'appareil en conformité avec les directives d'installation du fabricant et des autorités locales en bâtiment ou le service de prévention des incendies. Ne pas brancher cette unité à un conduit de fumée raccordé à un autre appareil.

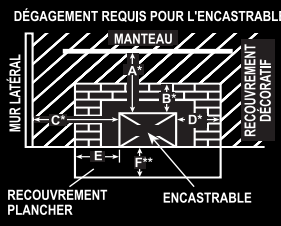
Ventilateur Optionnel, No. De Pièces: H7907 (noir), H7909 (plaqué nickel), H7910 (plaqué nickel, fini brossé)
Spécification Électrique Du Ventilateur: 120V, 60 Hz, 1 Amp
Trans Flow, QLN 652424-3045L

Ne pas faire passer le fil électrique sous ou en avant de l'appareil

Type de combustible: Bois seulement

Cet appareil de chauffage au bois doit être inspecté et entretenu périodiquement pour fonctionner correctement. Voir le manuel du propriétaire pour plus d'information. L'utilisation de cet appareil de chauffage au bois de manière incompatible avec les instructions du manuel du propriétaire constitue une infraction aux régulations fédérales.
Valeur d'émission du test d'homologation 1,55 g/h selon la norme 2020

Dégagements Minimums Aux Matériaux Combustibles - En Pouces (millimètres)



(A) Espace entre l'encastrable et le manteau de cheminée = USA-24", CAN-32" (813mm). Profondeur maximum de la tablette du manteau de cheminée 9"
(B) Espace entre l'encastrable et les matériaux combustibles du haut = USA -18" CAN-26" (660mm)
(C) Espace minimum entre l'encastrable et le mur de côté combustible = 18" (450mm)
(D) Espace minimum entre l'encastrable et les matériaux combustibles du côté = 15" (381mm)
(E) Minimum requis de matériel non combustible au plancher, de chaque côté de l'ouverture de l'appareil = 8" (200mm)
(F) Minimum requis de matériel non combustible à l'avant de l'appareil = 18" (450mm)

Le panneau protecteur de plancher doit être un matériel non combustible, dont l'épaisseur minimale est de 3/4" - 19mm (3/8" - 9.5mm USA) et dont le facteur k est de 0.84 ou l'équivalent. Installer seulement dans un foyer de maçonnerie construit selon UBC Chapitre 37 ou dans un foyer approuvé par le fabricant (référez-vous au manuel). Ne pas enlever de ciment ou de briques pour installer l'encastrable. L'installation de la cheminée peut s'effectuer avec ou sans connecteur à la sortie de l'appareil. Approuvé pour raccordement avec un conduit de tubage certifié en acier inoxydable de 6" (152mm) de diamètre. Tirer l'appareil et nettoyer l'arrière fréquemment car le créosote peut s'y accumuler rapidement.
*Les dégagements minimums peuvent être réduits pour A, B, C, D en utilisant un manteau optionnel et / ou des protecteurs latéraux. Contacter votre détaillant Innovative Hearth Products pour la dimension des protecteurs requise.
**Réduction du recouvrement de plancher : 2" (51mm) de moins si l'encastrable est élevé de 2" (51mm). Respecter 16" (406mm) de recouvrement de plancher minimum à l'avant de l'encastrable.

ATTENTION: L'APPAREIL EST CHAUD LORS DE L'OPÉRATION. NE PAS Y TOUCHER. RISQUE DE BRÛLURES CUTANÉES. TENIR LES ENFANTS, LES MATÉRIAUX COMBUSTIBLES, LES VÊTEMENTS ET LES MEUBLES ELOIGNÉS DE L'APPAREIL. VOIR LA PLAQUE SIGNALÉTIQUE ET LES DIRECTIVES. NE PAS SURCHAUFFER L'APPAREIL. SI L'APPAREIL OU LE TUYAU DE CHEMINÉE ROUGIT, VOUS SURCHAUFFEZ. INSPECTER ET NETTOYER LA CHEMINÉE ET LE TUYAU CONNECTEUR FRÉQUEMMENT. SOUS CERTAINES CONDITIONS, IL SE PEUT QUE LE CRÉOSOTE S'ACCUMULE RAPIDEMENT. NE SURÉLEVER PAS LE FEU À L'AIDE D'UN CHENET. DÉPOSER LES BÛCHES DE BOIS DIRECTEMENT SUR L'ÂTRE. LA PORTE DOIT ÊTRE FERMÉE PENDANT L'USAGE SAUF POUR ALIMENTER LE FEU. GARDER LA PORTE "BY-PASS" (CENDRES) FERMÉE POUR ÉVITER DE SURCHAUFFER. DANGER: RISQUES DE DÉCHARGE ÉLECTRIQUE. DÉCONNECTER LE FIL ÉLECTRIQUE DE LA PRISE DE CONTACT AVANT LE SERVICE. NE PAS FAIRE PASSER LE FIL ÉLECTRIQUE SOUS OU EN AVANT DE L'APPAREIL. POUR USAGE AVEC LE BOIS SEULEMENT.

NE PAS ENLEVER OU RECOUVRIR CETTE ÉTIQUETTE Fabriqué aux U.S.A.

NOTE: DIAGRAMS & ILLUSTRATIONS ARE NOT TO SCALE.

NOTES

NOTE: DIAGRAMS & ILLUSTRATIONS ARE NOT TO SCALE.

Innovative Hearth Products
IronStrike® Brand Wood Burning Stove and Insert
Limited Lifetime Warranty

THE WARRANTY
Innovative Hearth Products ("IHP") Limited Lifetime Warranty warrants your IronStrike® Brand Wood Burning Stove or Insert ("Product") to be free from defects in materials and workmanship at the time of manufacture. The Product body, firebox and ceramic glass carry the Limited Lifetime Warranty. Ceramic glass carries the Limited Lifetime Warranty against thermal breakage only. After installation, if covered components manufactured by IHP are found to be defective in materials or workmanship during the Limited Lifetime Warranty period and while the Product remains at the site of the original installation, IHP will, at its option, repair or replace the covered components. If repair or replacement is not commercially practical, IHP will, at its option, refund the purchase price or wholesale price of the IHP product, whichever is applicable. IHP will also pay IHP prevailing labor rates, as determined in its sole discretion, incurred in repairing or replacing such components for up to five years. THERE ARE EXCLUSIONS AND LIMITATIONS to this Limited Lifetime Warranty as described herein.

COVERAGE COMMENCEMENT DATE
Warranty coverage begins on the date of purchase. In the case of new home construction, warranty coverage begins on the date of first occupancy of the dwelling or six months after the sale of the Product by an independent IHP dealer/distributor, whichever occurs earlier. The warranty shall commence no later than 24 months following the date of product shipment from IHP, regardless of the installation or occupancy date.

EXCLUSIONS AND LIMITATIONS
This Limited Lifetime Warranty applies only if the Product is installed in the United States or Canada and only if operated and maintained in accordance with the printed instructions accompanying the Product and in compliance with all applicable installation and building codes and good trade practices.

This warranty is non-transferable and extends to the original owner only. The Product must be purchased through a listed supplier of IHP and proof of purchase must be provided. The Product body and firebox carry the Limited Lifetime Warranty from the date of installation. Vent components, trim components and paint are excluded from this Limited Lifetime Warranty. The following do not carry a Limited Lifetime Warranty but are warranted as follows:

Cast Iron Heat Exchanger – Replacement for five years from the date of installation
Cast iron parts – Replacement for one year from the date of installation
Catalyst – Carries a separate warranty. Refer to the warranty certificate provided for that part
Electrical components – Repair or replacement for one year from date of installation
Gaskets – Replacement for one year from the date of installation.
Gold & nickel plating – Replacement for two years from date of installation. Excludes tarnishing
Refractory & screens – Replacement for two years from date of installation. Excludes hairline cracks
Removable air tubes – Repair or replacement for seven years from date of installation. IHP prevailing labor rates for years one through five.
Labor coverage – Prevailing IHP labor rates apply for the warranty period of the component, unless otherwise noted

Parts not otherwise listed carry a 90 day warranty from the date of installation.

Whenever practicable, IHP will provide replacement parts, if available, for a period of 10 years from the last date of manufacture of the Product.

IHP will not be responsible for: (a) damages caused by normal wear and tear, accident, riot, fire, flood or acts of God; (b) damages caused by abuse, negligence, misuse, or unauthorized alteration or repair of the Product affecting its stability or performance. (The Product must be subject to normal use with approved fuels listed in the Operation Manual provided with the product. Fuel products with abnormal burning characteristics, including but not limited to fuel such as driftwood, coal or plywood and wood products using a binder may burn at excessive temperatures and may cause damage to the Product or may cause it to function improperly; IHP stoves, inserts and high efficiency EPA fireplaces are approved for burning dry seasoned wood only.); (c) damages caused by failing to provide proper maintenance and service in accordance with the instructions provided with the Product; (d) damages, repairs or inefficiency resulting from faulty installation or application of the Product.

Coverage of this Limited Lifetime Warranty is conditional upon the appliance being operated without the use of grates, irons or any other method to elevate the fire.

IHP is not responsible for inadequate system draft caused by air conditioning and heating systems, mechanical ventilation systems, or general construction conditions which may generate negative air pressure in the room in which the appliance is installed. Additionally IHP assumes no responsibility for smoking conditions caused by inadequate chimney height, adjoining trees or buildings, adverse wind conditions or unusual environmental factors and conditions. Certain IHP Products are listed for use with Security Chimneys International, Ltd. chimney systems only. Use of chimney components other than that specified in the Product manual will void the Product warranty.

This Limited Lifetime Warranty covers only parts and labor as provided herein. In no case shall IHP be responsible for materials, components or construction which are not manufactured or supplied by IHP or for the labor necessary to install, repair or remove such materials, components or construction. Additional utility bills incurred due to any malfunction or defect in equipment are not covered by this Limited Lifetime Warranty. All replacement or repair components will be shipped F.O.B. from the nearest stocking IHP factory.

LIMITATION ON LIABILITY
It is expressly agreed and understood that IHP's sole obligation and the purchaser's exclusive remedy under this warranty, under any other warranty, expressed or implied, or in contract, tort or otherwise, shall be limited to replacement, repair, or refund, as specified herein.

In no event shall IHP be liable for any incidental or consequential damages caused by defects in the Product, whether such damage occurs or is discovered before or after replacement or repair, and whether such damage is caused by IHP's negligence. IHP has not made and does not make any representation or warranty of fitness for a particular use or purpose, and there is no implied condition of fitness for a particular use or purpose.

IHP makes no expressed warranties except as stated in this Limited Lifetime Warranty. The duration of any implied warranty is limited to the duration of this expressed warranty.

No one is authorized to change this Limited Lifetime Warranty or to create for IHP any other obligation or liability in connection with the Product. Some states and provinces do not allow the exclusion or limitation of incidental or consequential damages, so the above limitations or exclusions may not apply to you. The provisions of this Limited Lifetime Warranty are in addition to and not a modification of or subtraction from any statutory warranties and other rights and remedies provided by law.

INVESTIGATION OF CLAIMS AGAINST WARRANTY
IHP reserves the right to investigate any and all claims against this Limited Lifetime Warranty and to decide, in its sole discretion, upon the method of settlement.

To receive the benefits and advantages described in this Limited Lifetime Warranty, the appliance must be installed and repaired by a licensed contractor approved by IHP.

Contact IHP at the address provided herein to obtain a listing of approved dealers/distributors. **IHP shall in no event be responsible for any warranty work done by a contractor that is not approved without first obtaining IHP's prior written consent.**

HOW TO REGISTER A CLAIM AGAINST WARRANTY
In order for any claim under this warranty to be valid, you must contact the IHP dealer/distributor from which you purchased the product. If you cannot locate the dealer/distributor, then you must notify IHP in writing. IHP must be notified of the claimed defect in writing within 90 days of the date of failure. Notices should be directed to the IHP Warranty Department at 1769 East Lawrence Street; Russellville, AL 35654 or visit our website at WWW.IRONSTRIKE.US.COM.

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P/N 900205-00, Rev. B 02/2018

Innovative Hearth Products
1769 East Lawrence Street • Russellville, AL 35654

WARRANTY

Your wood appliance is covered by a limited warranty (provided with the appliance). Please read the warranty to be familiar with its coverage.

Retain this manual. File it with your other documents for future reference.

REPLACEMENT PARTS

See ***Pages 21 through 23*** for a complete replacement parts list. Use only parts supplied from the manufacturer.

Normally, all parts should be ordered through your IHP distributor or dealer. Parts will be shipped at prevailing prices at time of order.

When ordering repair parts, always give the following information:

1. The model number of the appliance.
2. The Serial Number of the appliance.
3. The part number.
4. The description of the part.
5. The quantity required.
6. The installation date of the appliance.

If you encounter any problems or have any questions concerning the installation or application of this system, please contact your dealer.

Innovative Hearth Products (IHP)
1769 East Lawrence Street
Russellville, AL 35654
IronStrike.us.com

PRODUCT REFERENCE INFORMATION

We recommend that you record the following important information about your appliance. If you did not purchase your appliance directly from an IHP dealer, then contact us at IronStrike.us.com to find your nearest IHP dealer who will answer your questions or address your concerns.

Model Number _____

Serial Number _____

Date Installed _____

Your Dealer's Name _____

NATIONAL FIREPLACE INSTITUTE NFI CERTIFIED www.nficertified.org

We recommend that our woodburning hearth products be installed and serviced by professionals who are certified in the U.S. by the National Fireplace Institute® (NFI) as NFI Woodburning Specialists or who are certified in Canada by Wood Energy Technical Training (WETT).

Wood Energy Technical Training www.wettinc.ca

Innovative Hearth Products (IHP) reserves the right to make changes at any time, without notice, in design, materials, specifications, and prices, and also to discontinue colors, styles, and products. Consult your local distributor for fireplace code information.

INNOVATIVE HEARTH PRODUCTS

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P900980-00

CONTACT YOUR LOCAL BUILDING OR FIRE OFFICIALS ABOUT RESTRICTIONS AND INSTALLATION INSPECTION IN YOUR AREA. LISTED ROOM HEATERS, SOLID FUEL TYPE ALSO FOR USE IN MOBILE HOME INSTALLATION (USA ONLY) PURSUANT TO (UM)84-HUD

Report Number	Model	Serial No./Numéro de sérle:
14-185	Performer™ S210AGL	S210AGL-

IRONSTRIKE® HEAT FOR LIFE

Manufactured By / Fabriqué Par:
INNOVATIVE HEARTH PRODUCTS
1502 14th Street NW
Auburn, WA 98001 USA

PFS® C US

"PREVENT HOUSE FIRES"

Install and use only in accordance with manufacturer's installation and operating instructions and your local building codes.

CAUTION: Special methods are required when passing chimney through a wall or ceiling, refer to local building codes. Do not connect this unit to a chimney flue serving another appliance.

WARNING: (MOBILE HOME USA Only) An outside air inlet must be provided for combustion, and be unrestricted while unit is in use. Do not install appliance in a sleeping room. The structural integrity of the mobile home floor, walls and ceiling/roof must be maintained. Approval void when label is missing.

Model / Modèle: Performer™ S210AGL

Tested to/Testé selon: UL 1482, ULC S627

Type Of Fuel: Solid Wood Only

Optional Blower, Part No. H7917

Blower Electrical Rating: 120V, 60 Hz, 1 Amp

Do not route power cord under or in front of appliance.

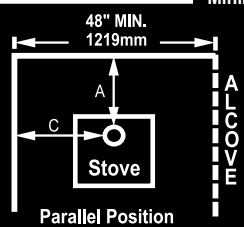
WARNING: Do not obstruct the space beneath the heater.

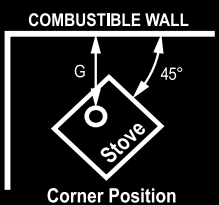
OPERATE ONLY WITH DOOR CLOSED.

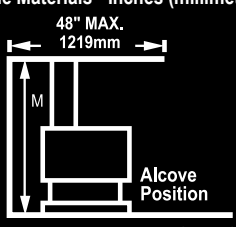
This wood heater needs periodic inspection and repair for proper operation. Consult the owner's manual for further information. It is against federal regulations to operate this wood heater in a manner inconsistent with the operating instructions in the owner's manual.

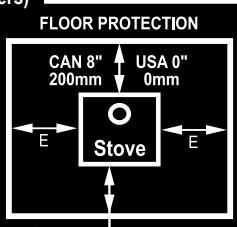
Certification test emission value 1.55 grams/hr per 2020 cordwood standard

Minimum Clearance to Combustible Materials - Inches (millimeters)









SUITABLE FOR MOBILE HOME INSTALLATION

PIPE	INSTALLATION	A	C	E†	G	M
Single Wall	Residential	USA-16" CAN-483mm	USA-24" CAN-635mm	8"/200mm	USA-18" CAN-533mm	84"/2134mm
Single w/Pipe Shield	Residential	USA-10" CAN-330mm	USA-24" CAN-635mm	8"/200mm	USA-18" CAN-533mm	84"/2134mm
Double Wall	Residential or Mobile Home*	USA-10" CAN-330mm	USA-18" CAN-483mm	8"/200mm	USA-15" CAN-450mm	72"/1829mm
Double Wall	Alcove	USA-10" CAN-330mm	USA-21" CAN-559mm	8"/200mm	N/A	72"/1829mm

† USA=8" (200mm) from door opening, Canada=8" (200mm) from sides and back of unit * Mobile Home - USA only

ALCOVE DIMENSIONS (double wall pipe only): Minimum 48" (1219mm) Width, Maximum 48" (1219mm) Depth.

FLOOR PROTECTOR: The hearth and/or floor protection must be a non-combustible hearth/floor protector with a minimum thickness of 3/8" (9.5mm), extending beneath the heater and to the front, sides, and rear as indicated.

NOTICE: All mobile home installations require outside air kits (OAK).

Clearance dimensions are to flue collar. If a single wall connector pipe with shield is used, a 1 inch air space is needed between pipe and shield. Shield attaches to rear of stove pipe and must run from stove top to ceiling. Pipe shield shall be UL listed.

CHIMNEY & CONNECTOR: Minimum 6" diameter, minimum 24 MSG black steel connector pipe with UL103HT listed factory-built chimney suitable for use with solid fuels or masonry chimney. Horizontal connection not tested, refer to local building codes for installation. Clearances to connector shall be measured from 6" flue collar. Restrictions apply! Read instructions before installing.

Mobile Home approved Class A - UL 103HT chimney and double wall connectors:

- Security
- Projet
- Jakes Evans/GSW
- Dura-Vent
- Metal Fab
- Ameri-Tec
- Metalbestos
- Industrial Chimney

RESIDENTIAL chimney systems must be from the same brands as listed for mobile homes but connector pipe may be double wall, single wall, or single wall with shield as listed above.
Connector pipe and chimney must be of the same brand.

COMPONENTS REQUIRED FOR INSTALLATIONS: Legs AND Bottom Heat Shield or Pedestal Base. If optional blower is NOT used, Rear Heat Shield Block Off Plate shall be installed.



CAUTION: HOT WHILE IN OPERATION. DO NOT TOUCH. KEEP CHILDREN, CLOTHING, FURNISHINGS AND COMBUSTIBLE MATERIAL A CONSIDERABLE DISTANCE AWAY. CONTACT MAY CAUSE SKIN BURNS. SEE NAMEPLATE AND INSTRUCTIONS. DO NOT OVERFIRE. IF HEATER OR CHIMNEY CONNECTOR GLOWS, YOU ARE OVERFIRING. INSPECT AND CLEAN CHIMNEY AND CONNECTOR FREQUENTLY. UNDER CERTAIN CONDITIONS OF USE, CREOSOTE BUILDUP MAY OCCUR RAPIDLY. DO NOT USE GRATE OR ELEVATE FIRE - BUILD WOOD FIRE DIRECTLY ON HEARTH. FEED DOOR MUST BE CLOSED DURING FIRING EXCEPT WHEN ADDING FUEL. KEEP ASH DOOR CLOSED TO AVOID EXCESS HEAT. DANGER: RISK OF ELECTRICAL SHOCK. DISCONNECT POWER BEFORE SERVICING UNIT. TYPE OF FUEL: SOLID WOOD ONLY.

Date of Manufacture / Date De Fabrication

2019	2020	2021	JAN JANV	FEB FEVR	MAR MARS	APR AVR	MAY MAI	JUN JUIN	JUL JUIL	AUG AOÛT	SEP SEPT	OCT OCT	NOV NOV	DEC DEC
■	■	■	■	■	■	■	■	■	■	■	■	■	■	■

U.S. ENVIRONMENTAL PROTECTION AGENCY
Certified to comply with 2020 cordwood standard.

Part No. 900981-03 Rev. 0, 04/2019 DO NOT REMOVE THIS LABEL Made in U.S.A.

IRONSTRIKE® HEAT FOR LIFE

INSTALLATION AND OPERATION MANUAL

COUNTRY® COLLECTION

Free-Standing
EPA Certified
Wood-Burning Stoves

Save These Instructions For Future Reference

P/N 900981-00, Rev. NC, 05/2019



Performer S210AGL

P900981-00

Wood Stoves
Models Performer™ S210GL

PFS® C US

Report # 14-185

NATIONAL FIREPLACE INSTITUTE NFI CERTIFIED
www.nficertified.org

We recommend that our woodburning hearth products be installed and serviced by professionals who are certified in the U.S. by the National Fireplace Institute® (NFI) as NFI Woodburning Specialists or who are certified in Canada by Wood Energy Technical Training (WETT).

Wood Energy Technical Training

A French manual is available upon request. Order P/N 900981-01.

Ce manuel d'installation est disponible en francais, simplement en faire la demande. Numéro de la pièce 900981-01.

This appliance must be properly installed and operated in order to prevent the possibility of a house fire. Please read this entire installation and operation manual before installing and using your wood stove. Failure to follow these instructions could result in property damage, bodily injury or even death. Contact your local building or fire officials to obtain a permit and information on any installation requirements and inspection requirements in your area.

⚠ WARNING

- **Hot! Do not touch! The glass and surfaces of this appliance will be hot during operation and will retain heat for a while after shutting off the appliance. Severe burns may result.**
- **Carefully supervise children in the same room as appliance.**

Agency Copy

CONGRATULATIONS!

When you purchased your new wood stove, you joined the ranks of thousands of individuals whose answer to their home heating needs reflects their concern for aesthetics, efficiency and our environment. We extend our continued support to help you achieve the maximum benefit and enjoyment available from your new wood stove.

Thank you for selecting a Innovative Hearth Products (IHP) wood stove as the answer to your home supplemental heating needs.

TABLE OF CONTENTS

Using This Manual 2
Important Safety Information 3
Testing Information 4
Draft Requirements 4
Selecting the Proper Venting System 4
Negative Pressure Warning 5
Creosote 5
Disposal of Ashes 5
Fuel 6
Paint Curing 6
Burn-In Period 6
Clearances to Combustibles 7-8
Floor Protection 7
Reduced Clearances 7
Alcove Clearances 7
Chimney and Connector 7
Components Required for Installation 7
Installation Clearances 8
Typical Installation Figures 9
Chimney Installation 10
Manufactured (mobile) Home Installations 10
Chimney - Wall Pass-Through Requirements 11
Leg and Heatshield Installation 12
Outside Air Kit Installation 12
Stove Installation 13
Pedestal Installation 14
Post Installation Checks 15
Brick Installation 15-16
Operating Hints 17
Starting and Maintaining a Fire 17
Blower Operation (optional kit) 18
Operating Techniques and Hints 19
Getting the Most Out of Your Stove 19
Maximizing Your Stove's Overall Efficiency 19
Achieving Clean, Long Burns 19
Maintenance 20-21
Troubleshooting 22
Do's and Don'ts 23
Smoke Detector Recommended 23
Carbon Monoxide Monitor Recommended 23
Replacement Parts Lists 24-28
Accessories 29
Safety / Listing Label 30
Warranty 31
Product Reference Information 32

USING THIS MANUAL

Please read and carefully follow all of the instructions found in this manual. Please pay special attention to the safety instructions provided in this manual.

PRODUCT IS SUBJECT TO CHANGE WITHOUT NOTICE

IMPORTANT SAFETY AND WARNING INFORMATION

READ THIS MANUAL IN ITS ENTIRETY AND UNDERSTAND THESE RULES TO FOLLOW FOR SAFETY.

1. When this room heater is not properly installed, a house fire may result. To reduce the risk of fire, follow the installation instructions. Contact local building or fire officials about restrictions and installation inspection requirements in your area.
2. Wear gloves during installation to avoid injury from sharp edges on the stove and/or its parts.
3. This unit is designed and engineered to burn only dry, well-seasoned wood. Burning wet wood will greatly reduce the stove's efficiency, produce excessive amounts of smoke and can cause dangerous chimney fires due to creosote build-up.
4. Before opening the door, the draft control must be fully open to avoid possible combustion flash (ignition of hot volatile gases as the door is opened).
5. Never use gasoline, gasoline-type lantern fuel, kerosene, charcoal lighter fluid, or similar liquids to start or 'freshenup' a fire in this heater. Keep all such liquids well away from the heater while it is in use. DO NOT USE CHEMICALS OR FLUIDS TO START THE FIRE.
6. While burning, fuel utilizes oxygen from the air in the room. Be sure to allow an adequate amount of fresh air into the room where the stove is burning.
7. The outside surface of the stove will be hot while burning properly and can set items like clothing and curtains on fire. Keep furnishings and other combustible materials away from the stove. Using the heat from the stove to dry wet clothing can be hazardous if clothes are placed too near the surface of the stove.
8. HOT WHILE IN OPERATION. KEEP CHILDREN, CLOTHING FURNISHINGS AND COMBUSTIBLE MATERIAL A CONSIDERABLE DISTANCE AWAY. CONTACT MAY CAUSE SKIN BURNS. Do not allow children to play near the stove without close supervision. Do not touch the stove while it is burning. Use extreme caution while the unit is in use. Surface temperatures become dangerously hot and can cause serious burns.
9. Do not allow anyone to operate the stove who is not familiar with the operating instructions.
10. Attempts to achieve heat output rates that exceed stove design specifications can result in permanent damage to the stove. Never leave your stove unattended on high burn rates. This may cause overfiring. Overfiring the stove may cause a house fire. If the stove glows, you are overfiring.
11. Keep a water hose or hand-operated fire extinguisher close for safety.
12. Smoke Detectors - Since there are always several potential sources of fire in any home, we recommend installing smoke detectors. If possible, install the smoke detector in a hallway adjacent to the room (to reduce the possibility of occasional false activation from the heat produced by the stove). If your local code requires a smoke detector be installed within the same room, you must follow the requirements of your local code. Check with your local building department for requirements in your area.
13. Inspect your chimney at least once a month during the burning season to check for soot and creosote accumulations. Any accumulations over 1/8" thick should be removed by a professional chimney sweep. Do not attempt to burn out heavy creosote accumulations with a hot fire. If large accumulations are occurring, review your burning procedures.
14. If a creosote fire should develop, the fire department should be called immediately and then attempts should be made to control the fire until assistance arrives. If a "runaway" fire should develop causing over-heating of the stove, the door and draft regulators should be closed immediately. The fire should die down once deprived of oxygen. After a severe chimney fire, the complete chimney system should be checked before further use.
15. Do Not Use Grate Or Elevate Fire - Build Wood Fire Directly On Hearth (firebrick). Do not use andirons or other methods of supporting the fuel.
16. Please read this entire manual before you install and use your new room heater. Failure to follow instructions may result in property damage, bodily injury, or even death.
17. Check all local building and safety codes before installation. The installation instructions and appropriate code requirements must be followed exactly and without compromise. In the absence of local codes the following standards and codes must be followed.
18. In the U.S.A, install in accordance with the National Fire Protection Association's Code, NFPA 211, Standards for Chimneys, Fireplaces, Vents and Solid-Fuel-Burning Appliances, or similar regulations, may apply to the installation of a Solid-Fuel-Burning appliance in your area. In Canada, the guideline is established by the CSA Standard, CAN/CSA-B365-M93, Installation Code for Solid-Fuel-Burning Appliances and Equipment.
19. DO NOT CONNECT TO OR USE IN CONJUNCTION WITH ANY AIR DISTRIBUTION DUCTWORK UNLESS SPECIFICALLY APPROVED FOR SUCH INSTALLATIONS.
20. WARNING: BURNING IMPROPER FUEL (I.E. CHARCOAL) CAN RESULT IN CARBON MONOXIDE POISONING, WHICH MAY LEAD TO DEATH!
21. Carbon Monoxide Poisoning – Early signs of carbon monoxide poisoning resemble the flu with headaches, dizziness, or nausea. If you have these signs, get fresh air at once! Have the heater inspected by a qualified service technician. Some people are more affected by carbon monoxide than others. These include pregnant women, people with heart or lung disease or anemia, those under the influence of alcohol, and those at high altitudes.
22. Failure to use manufacturer provided parts, variations in techniques and construction materials or practices other than those described in this manual may create a fire hazard and void the limited warranty.
23. Do not make any make-shift compromises during installation. Any modification or alteration may result in damage to the appliance or dwelling and will void the warranty, certification and listings of this unit.
24. These appliances are designed as supplemental heaters. Therefore, it is advisable to have an alternate heat source when installed in a dwelling.
25. Do Not Overfire – If Heater or Chimney Connector Glows, You Are Overfiring.
26. DO NOT CONNECT THIS UNIT TO A CHIMNEY FLUE SERVING ANOTHER APPLIANCE.
27. DO NOT BURN GARBAGE OR FLAMMABLE FLUIDS SUCH AS GASOLINE, NAPHTHA OR ENGINE OIL.

28. This wood heater has a manufacturer-set minimum low burn rate that must not be altered. It is against federal regulations to alter this setting or otherwise operate this wood heater in a manner inconsistent with operating instructions in this manual.

⚠ WARNING

This product can expose you to chemicals including Carbon Black, which is known to the State of California to cause cancer, and Carbon Monoxide, which is known to the State of California to cause birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov

TESTING INFORMATION

This manual describes the installation and operation of these non-catalytic wood heaters. These heaters meet the U.S. Environmental Protection Agency's emissions limits, and are compliant with 2020 EPA NSPS particulate emission standards. These heaters have been developed, tested and constructed in accordance with the requirements of UL 1482, ULC S627 and HUD standards and are listed by PFS Corporation. These heaters have been approved for residential, mobile home and alcove installations.

Model	Emission Rate	BTU/hr Output Range	Max. Output BTU/hr	Tested Average Efficiency
S210	1.55 g/hr	9,500-36,100	76,000	71.0%

DRAFT REQUIREMENTS

Your wood stove is dependent upon a properly functioning chimney for optimum performance. It is a high efficiency appliance that loses much less heat up the chimney than older appliances and fireplaces. For this reason it is important to match the stove to the chimney. The chimney has two functions:

1. It draws combustion air into the appliance (without air, no fuel will burn) and
2. It exhausts combustion by-products. Your new appliance is what is known as a "natural draft" appliance.

The appliance depends solely on the natural draft of the chimney system to draw combustion air into the unit. Draft is the force that moves air from the appliance up into the chimney. The amount of draft in your chimney depends on the length of the chimney, local geography, nearby obstructions and other factors. Too much draft may cause excessive temperatures in the appliance (overfiring). Slow or inadequate draft equals poor combustion and possible smoking problems. The following are some conditions that may contribute to poor chimney draft:

1. A chimney too large for your appliance.
2. A chimney with not enough height to produce adequate draft.
3. A chimney with excessive height (this may allow exhaust to cool too much before exiting, which will stall the rate the exhaust exits).
4. Offsets in the venting system are too restrictive (see *Chimney Guidelines)*.

Inadequate draft will cause the appliance to leak smoke into the room through the stove and the chimney connector joints.

Excessive draft may cause an uncontrollable burn or a glowing red stove or chimney part.

Overfiring Damage - If the heater or chimney connector glows, you are overfiring. Other symptoms may include: Cracking, warping or burning out of components, plated accessories may turn color, stove glass may develop a haze, which will not come off with cleaning.

Overfiring of a stove is a condition where excessive temperatures are reached, beyond the design capabilities of the appliance. The damage that occurs from overfiring is not covered under the manufacturer's limited warranty.

Also see *Troubleshooting* on ***Page 22***.

SELECTING THE PROPER VENTING SYSTEM

The appliance is merely one component of a larger system. The other equally important component is the venting system. This is necessary for achieving the required flow of combustion air to the fire chamber and for safely removing unwanted combustion byproducts from the appliance. If the venting system's design does not promote these ends, the system may not function properly. Poorly functioning venting systems may create performance problems as well as be a safety hazard. **A draft test should read greater than .04' W.C. (inches water column) and less than .08" W.C**. As per NFPA-211 standard (see paragraph below), the installer must take into account all variables within the installation and install the appliance in such a manner that satisfies the draft requirements of the appliance. See *Chimney Guidelines* below to assist you in selecting the proper venting system for your installation.

American National Standards Institute ANSI/NFPA 211, Standard for Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances - See Draft Section: A chimney or vent shall be so designed and constructed to develop a flow sufficient to completely remove all flue and vent gases to the outside atmosphere. The venting system shall satisfy the draft requirements of the connected appliance in accordance with the manufacturer's instructions.

Chimney Guidelines:

- This appliance requires approximately 12 feet minimum of "effective draw" provided by the venting system. As a rule of thumb, every 90 degree total direction change in the venting will result in a loss of approximately 5 feet of "effective draw." Example: If two 45 degree offsets are used, subtract 5 feet from the actual vertical vent height to determine your "effective draw." In this case if you had 14 feet of vertical vent, the effective draw would only be approximately 9 feet (14 ft. - 5 ft. = 9 ft.), therefore it may be necessary to add additional height to the venting system.
- Do not install an offset within the first two feet above the flue outlet on the appliance.
- In well insulated and weather tight homes, it may be difficult to establish a good draft up your chimney. The poor draft is caused by a shortage of air in the house. In this situation an Outside Air Kit may need to be installed *(See Negative Pressure Warning on* ***Page 5*** *and Outside Combustion Air on* ***Page 12****)*.

Chimney Height Requirements

The chimney must extend 3' (.92m) above the level of roof penetration and a minimum of 2' (.61m) higher than any roof surface within 10' (3m) (see below). Check with your local building officials for additional requirements for your area.

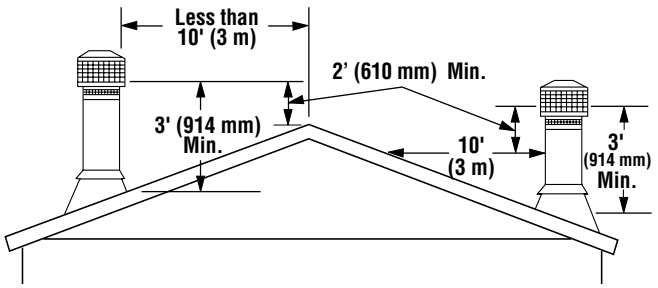


***Figure 1** - Chimney Height Requirements*

To pass inspection in nearly any jurisdiction, the chimney must meet both safety and exhaust flow requirements. The (3' by) 2' by 10' rule applies to both masonry and factory-built chimneys.

**** Ref. USA - National Standard, NFPA 211-latest edition and Canada National Standard CSA B365-01-latest edition. Vents installed with a listed cap shall terminate in accordance with the terms of the cap's listings.***

NEGATIVE PRESSURE WARNING

This appliance is not designed to be operated in a negative pressure. In very airtight homes with large kitchen exhaust fans, furnace cold air returns, fresh air exchange systems and any other air system in close proximity to the heating appliance may create a negative pressure in the same room as the heating appliance. This can create dangerous back drafting of the stove and chimney joints, drawing combustion by-products into the home. Be sure your home has adequate makeup air to eliminate negative pressures caused by the above-mentioned sources. Outside air connected to the appliance probably will not resolve such a problem as the appliance is not the source of negative pressure. IHP accepts no liability for damages resulting from negative pressures described here.

Ventilation Requirements - Provide adequate air for combustion. The fresh air requirements of this appliance must be met within the space where it will be installed. Ventilation is essential when using a Solid-Fuel-Burning heater. In well insulated and weather tight homes, it may be difficult to establish a good draft up the chimney (caused by a shortage of air in the home). The lack of air is caused by many common household appliances which exhaust air from the home (such as a furnace, heat pump, air conditioner, clothes dryer, exhaust fans, fireplaces, and other fuel burning appliances). Also, the combustion process of this heater uses oxygen from inside the dwelling. If the available fresh air delivery in the dwelling is insufficient to support the demands of these appliances, problems can result (i.e. excessive negative pressure can develop in the dwelling which will affect the rate at which this appliance can draft thus resulting in performance problems. To correct this problem it may help to open a window (preferably on the windward side of the house) or install an optional outside air kit.

CREOSOTE FORMATION AND NEED FOR REMOVAL

When wood is burned slowly, it produces tar and other organic vapors, which combine with expelled moisture to form creosote. The creosote vapors condense in the relatively cool chimney flue of a slow-burning fire. As a result, creosote residue accumulates on the flue lining. When ignited, this creosote makes an extremely hot fire.

The chimney and chimney connector should be inspected at least once monthly during the heating season to determine if a creosote buildup has occurred. If creosote has accumulated (1/8" [3 mm] or more), it should be removed to reduce the risk of a chimney fire.

Establish a routine for the fuel, wood burner and firing technique. Check daily for creosote build-up until experience shows how often you need to clean to be safe. Be aware that the hotter the fire the less creosote is deposited, and weekly cleaning may be necessary in mild weather even though monthly cleaning may be enough in the coldest months. Contact your local municipal or provincial fire authority for information on how to handle a chimney fire. Have a clearly understood plan to handle a chimney fire.

DISPOSAL OF ASHES

Whenever ashes get 3 to 4 inches deep in your firebox, and when the fire has burned down and cooled, remove excess ashes. Leave an ash bed approximately 1 inch deep on the firebox bottom to help maintain a hot charcoal bed.

Ashes should be scooped out of a cool stove or fireplace insert with a small metal shovel. Ashes should be placed in a steel container with a tight fitting lid and moved outdoors immediately. Other waste shall not be placed in this container. The closed container of ashes should be placed on a non-combustible floor or on the ground, well away from all combustible materials, pending final disposal. If the ashes are disposed of by burial in soil or otherwise locally dispersed, they should be retained in the closed container until all the cinders have thoroughly cooled. Ashes can ignite up to 72 hours after removal from the appliance.

FUEL

This appliance is designed to burn dry seasoned natural wood only (see *Page 23* for a list of prohibited fuels). Failure to burn proper fuels only will void the certification and the warranty of the appliance.

Dry, seasoned wood is that which has been cut, split and allowed to dry under a covered area where air is free to flow and circulate under and around the wood (not under a tarp or plastic). Make sure wood is not stacked directly on the ground, it may absorb moisture from the ground. It should be allowed to dry in these conditions for a minimum of six months, preferably one year or more. **IT MUST BE UNDERSTOOD THAT WOOD CANNOT BE LEFT IN ANY KIND OF WET OR DAMP AREA OR IT WILL NEVER BECOME COMPLETELY SEASONED.**

Do Not store fuel within space heater installation clearances or within the space required for refueling and ash removal.

DO NOT OVERFIRE THIS HEATER

Attempts to achieve heat output rates that exceed heater design specifications can result in permanent damage to the heater.

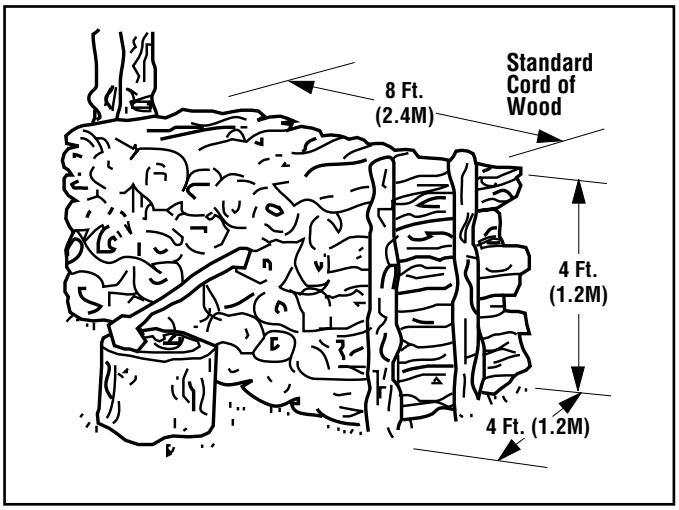
What does "Well-Seasoned" mean?

When a tree is cut down, the wood is green, full of sap and moisture. This moisture content can exceed 80%, which must be reduced to less than 20%. Wood properly seasoned is then capable of generating the heat the stove was designed to provide.

Green wood does not burn easily. Attempting to burn green wood often results in a lot of smoke and very little fire. Time is the most important factor in seasoning wood. Ideally the moisture content should be reduced to 11-20%. ***NOTE: The use of a firewood moisture meter is recommended to ensure the firewood contains less than 20% moisture.***

Seasoning Guide
Softwoods - 6 months to 18 months
Hardwoods - 12 months to 24 months

Logs that are 5" diameter across or larger should be split in half, three pieces if over 8 inches, and four pieces when over a foot across. If a tree has been dead for 2 - 4 years it still needs to be cut, split, and seasoned for 6 to 24 months depending on the wood.



PAINT CURING

If your appliance has plated accessories, be sure to clean plated surfaces with a household type glass cleaner and a very soft cloth to remove any fingerprints and residues prior to the first fire and before any fire if the plated surfaces have been handled or soiled. Do not close the door tightly during the "Burn-In Period." Also, open the door frequently (every 5-10 minutes) to keep the gasket from adhering to the curing paint. Ventilate the house well during these first firings as the paint gives off carbon dioxide and unpleasant odors. It is recommended that persons sensitive to an imbalance in the indoor air quality avoid the appliance during the curing process.

Your new appliance is painted with a high temperature paint that cures during the first few firings. We recommend that you put your stove or fireplace insert through a regimen of three burns. The first two should last for 20 minutes each at 250 degrees (the appliance should be allowed to cool completely between each burn). The third should be a burn of at least 450 degrees F. for 45-60 minutes. The paint will become soft, gummy and emit non-toxic smoke during these burns. After the appliance cools down for the third time, the paint will harden. **DO NOT BUILD A LARGE ROARING FIRE UNTIL THIS CURING EFFECT IS COMPLETE OR YOU MAY DAMAGE THE FINISH OF YOUR STOVE.** Spray can touch-ups should be done only with a high temperature stove paint (cat. no. H8159), available from all IHP dealers.

BURN-IN PERIOD

Please be patient with the heat output of your appliance for the first few weeks. The steel will go through a curing process that eliminates moisture, which is deep in the steel and firebrick. This moisture will reduce initial heat output of your appliance and may make it difficult to start. **(DO NOT OVERFIRE THE STOVE DURING THIS PROCESS. IF THE STOVE OR CHIMNEY BECOMES RED, REDUCE THE AMOUNT OF AIR ENTERING THE STOVE IMMEDIATELY).**

NOTE: DIAGRAMS & ILLUSTRATIONS ARE NOT TO SCALE.

CLEARANCES TO COMBUSTIBLES

WARNING: BE ABSOLUTELY SURE THE DISTANCE BETWEEN THE HEATER AND THE SURFACE OF ANY COMBUSTIBLE CONSTRUCTION IS NOT LESS THAN SHOWN IN THE FIGURES ON PAGE 8.

Floor Protection

USA - The floor in front and under the heater must be protected with noncombustible material. The covering must extend 16" in front of the door opening of the heater and 8" to either side of the door opening.

Canada - The floor in front and under the heater must be protected with noncombustible material. The covering must extend 450 mm in front of the door opening of the heater and 200 mm to either side of the stove body and 200 mm to the rear or to the wall, whichever is smaller.

USA and Canada - A chimney connector / venting extends horizontally over the floor, protection must also cover the floor under the connector / venting and at least 2" (51 mm) to either side.

Reduced Clearances

Clearances to combustible surfaces can be reduced with the use of listed double wall connector pipe. See the clearances with double wall pipe on the following page.

Alcove Clearances:

In alcove installations, only 6" double wall connector pipe can be used (single wall or single wall pipe with shield is not allowed). Minimum alcove width between combustible materials is 48" (1219 mm). Maximum alcove depth is 48" (1219 mm). Minimum alcove height is 72" (1829 mm).

Chimney and Connector

Minimum 6" diameter, minimum 24 MSG black steel connector pipe with UL103HT listed factory-built chimney suitable for use with solid fuels or masonry chimney. Horizontal connection not tested, refer to local building codes for installation. See installation instructions for details. Restrictions apply! Read instructions before installing.

Residential chimney systems must be from the same brands as listed for mobile homes but connector pipe may be double wall, single wall or single wall with shield as listed above.

This appliance may be vented into a code-approved masonry chimney with flue liner.

WARNING: Chimney connector must be in good condition and kept clean. Do not install damaged parts.

All of the stove connector pipe used must be of the same brand. The chimney that the stove pipe transitions into may be a different brand. Other than the transition of the stove pipe into the chimney, do Not mix different brand vent components. Install all vent components per vent manufacturer's instructions.

The chimney connector shall not pass through an attic or roof space, closet or similar concealed space, or a floor, or ceiling. Where passage through a wall, or partition of combustible construction is desired, the installation shall conform to CAN/CSA-B365, Installation Code for Solid-Fuel-Burning Appliances and Equipment.

There must be an effective vapor barrier at the location where the chimney or other component penetrates to the exterior of the structure. Follow the vent manufacturer's detailed instructions.

IMPORTANT NOTE: See *Draft Requirements* and *Selecting a Proper Venting System* on ***Page 4*** to assist you in choosing the proper venting system for your installation.

Clearance dimensions are to flue collar. If a single wall connector pipe with shield is used, a 1 inch air space is needed between pipe and shield. Shield attaches to rear of stove pipe and must run from stove top to ceiling. Pipe shield shall be UL listed.

Components Required For Installations

Legs AND Bottom Heat Shield or Pedestal Base. If optional blower is NOT used, Rear Heat Shield Block Off Plate shall be installed.

Use all required components specified for this appliance. Do not substitute.

WARNING: In the event that you remove the blower for any reason, make sure a cover plate (available from IHP) is installed before using the heater. Excessive rear wall temperatures will result if the stove is burned without the cover plate. ***NOTE: The cover plate is not necessary if a blower has never been installed because a knock-out will be in place to act as the cover.***

NOTE: DIAGRAMS & ILLUSTRATIONS ARE NOT TO SCALE.

INSTALLATION CLEARANCES - REFER TO *FIGURES 2, 3 AND 4*

PIPE	INSTALLATION	A	B (1)	C	D (1)	E†	F (1,4)
Single Wall	Residential	USA-16" CAN-483mm	13-3/4" 349mm	USA-24" CAN-635mm	14-1/2" 368mm	8" 200mm	9" 229mm
❷Single w/ Pipe Shield	Residential	USA-10" CAN-330mm	7-3/4" 197mm	USA-24" CAN-635mm	14-1/2" 368mm	8" 200mm	9" 229mm
Double Wall	Residential or Mobile Home*	USA-10" CAN-330mm	7-3/4" 197mm	USA-18" CAN-483mm	8-1/2" 216mm	8" 200mm	6" 152mm
Double Wall	Alcove	USA-10" CAN-330mm	7-3/4" 197mm	USA-21" CAN-559mm	8-1/2" 216mm	8" 200mm	6" 152mm

PIPE	INSTALLATION	G (4)	H (2)	I (6)	J (2)	K	L (5)
Single Wall	Residential or Alcove	USA-18" CAN-533mm	USA-37-3/4" CAN-1213mm	USA-51" CAN-1422mm	USA-34-3/4" CAN-1048mm	USA-16" CAN-450mm	USA 0" CAN-200mm
❷Single w/ Pipe Shield	Residential or Alcove	USA-18" CAN-533mm	USA-37-3/4" CAN-1213mm	USA-45" CAN-1270mm	USA-34-3/4" CAN-1048mm	USA-16" CAN-450mm	USA 0" CAN-200mm
Double Wall Air-Cooled	Residential or Alcove or Mobile Home*	USA-15" CAN-450mm	USA-37-3/4" CAN-1213mm	USA-45" CAN-1270mm	USA-34-3/4" CAN-1048mm	USA-16" CAN-450mm	USA 0" CAN-200mm
Double Wall	Alcove	N/A	USA-37-3/4" CAN-1213mm	USA-45" CAN-1270mm	USA-34-3/4" CAN-1048mm	USA-16" CAN-450mm	USA 0" CAN-200mm

PIPE	INSTALLATION	M	T (6)
Single Wall	Residential or Alcove	84" 2134mm	USA-61-3/4" CAN-1619mm
❷Single w/ Pipe Shield	Residential or Alcove	84" 2134mm	USA-61-3/4" CAN-1619mm
Double Wall Air-Cooled	Residential or Alcove or Mobile Home*	72" 1829mm	USA-57-1/2" CAN-1727mm
Double Wall	Alcove	72" 1829mm	USA-57-1/2" CAN-1727mm

† USA=8" (200mm) from door opening, Canada=8" (200mm) from sides and back of unit

❶ Dimensions to Stove Body

❷ Clearances may only be reduced by means approved by the regulatory authority.

* Mobile Home - USA only

Top View
Corner Clearance, Stove and Flue to Wall

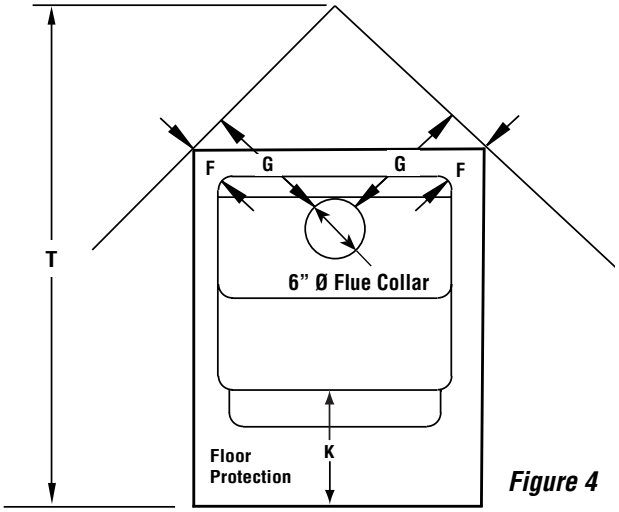


Figure 4

Top View-Parallel Installation

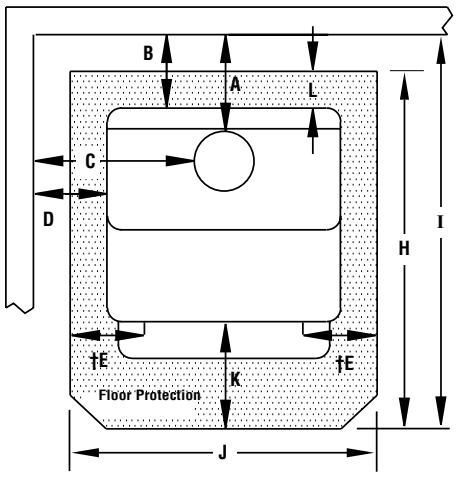


Figure 2

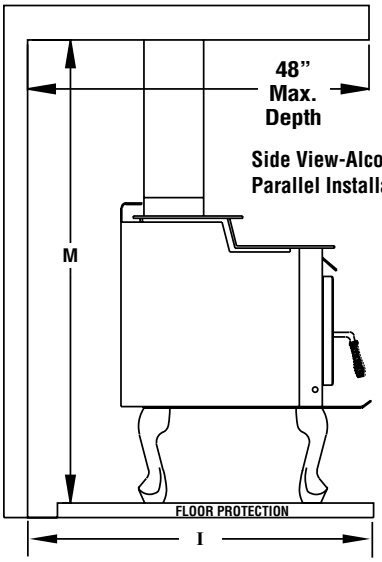


Figure 3

Footnotes:

1- These dimensions to the stove body are for reference only. Actual distances should be measured from the stove's flue collar.
2- Minimum noncombustible hearth pad dimensions.
3- Shield shall be attached to the rear of the stove pipe with a 1" air space and must run from the top of the stove to the ceiling.
4- Not applicable to alcove installations.
5- In corner applications, when installed at minimum back wall clearances, the required floor protection is dimensioned off the back plane of the stove, therefore the floor protection required off the back corners (at a 45 degree angle) only needs to extend to the wall. This situation will only occur in CANADA installations.
6- Reference dimension only, to assist in planning the installation.

Clearances to connector pipe shall be measured from the flue collar of the stove.

NOTE: DIAGRAMS & ILLUSTRATIONS ARE NOT TO SCALE.

Single Wall Pipe
Using 6” Diameter Single Wall Connector Pipe

INSTALL VENTING SYSTEM PER VENT MANUFACTURERS INSTRUCTIONS!

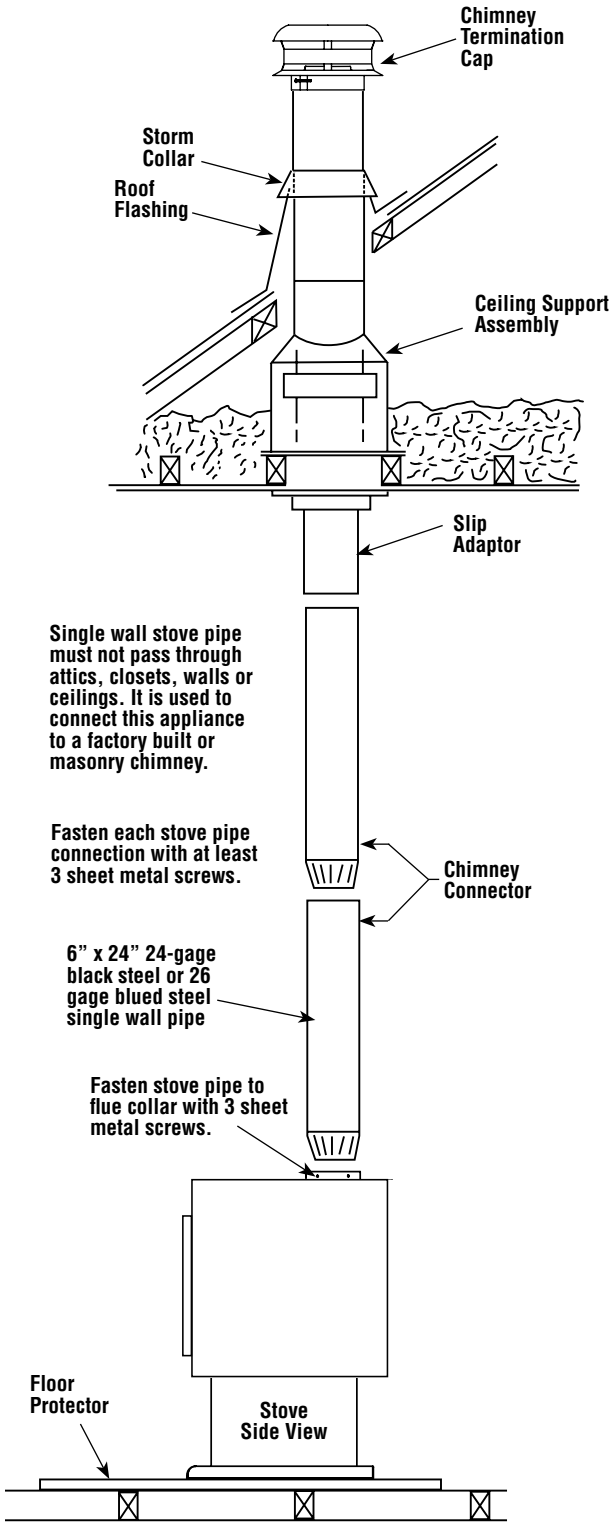


Figure 5 - Typical Installation

STAINLESS STEEL LINER
Using 6” Diameter Rigid Stainless Steel Liner

INSTALL VENTING SYSTEM PER VENT MANUFACTURERS INSTRUCTIONS!

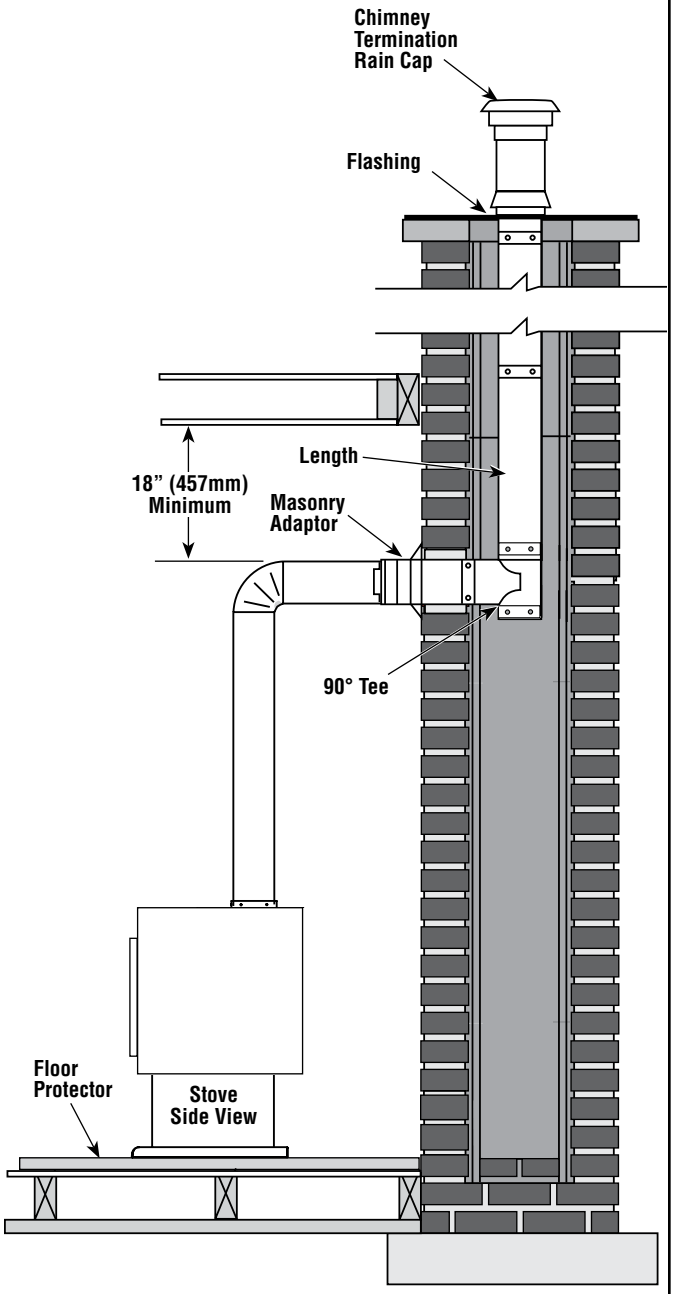


Figure 6 - Connected to a Masonry Chimney

YOUR CHIMNEY INSTALLATION MUST COMPLY WITH LOCAL BUILDING AND FIRE CODES.

NOTE: DIAGRAMS & ILLUSTRATIONS ARE NOT TO SCALE.

CHIMNEY INSTALLATION

- Install chimney as per manufacturer's instructions. Some brands of pipe may require removal of the spacer ring in the flue collar.
- All horizontal runs of pipe should be as short as possible and are required by NFPA No. 211 to have an upward pitch or rise in the same direction the smoke travels of no less than 1/4" to the linear foot. The connector pipe must meet minimum clearances in any direction to walls or other combustible materials. It must attach to a listed double wall metal chimney at least 6" in diameter or to a masonry chimney with a flue passage of at least 48 square inches.
- It is required that a chimney connector pipe not extend further than the inner wall of the flue when it is connected to a masonry chimney and that it either be cemented to the masonry or be installed without cement in a thimble connected to the masonry wall. When the connector is inserted into a thimble, the joint must be tight enough so that it will not be dislodged in normal use. Install connector at no less than the minimum clearances from the ceiling when using a 90-degree elbow to pass through combustible constructions.
- Chimney connector pipes should never pass through a floor, ceiling, fire wall, partition, or combustible construction of any type unless certain precautions are taken. The best method is to use a listed thimble and a listed chimney in accordance with the manufacturer's directions. NFPA No. 211 gives approved methods for passing a flue pipe through combustible constructions *(see **Page 11**)*.

Manufactured Home Installations
*(ref. **Figure 7**)*

This appliance is approved for installation into a manufactured (mobile) home in the USA ONLY!

Installation should be in accordance with the Mobile Home Construction and Safety Standard, Title 24 CFR, Part 3280 (in Canada CAN/CSA Z240 MH), or, when such a standard is not applicable, the Standard for Mobile Home Installations, ANSI A225.1.

All mobile home installations require an outside air kit (see ***Page 29*** for ordering information). The stove must be secured to the floor and grounded to the chassis of the mobile home.

WARNING: DO NOT INSTALL IN SLEEPING ROOM OF A MOBILE HOME.

CAUTION: THE STRUCTURAL INTEGRITY OF THE MOBILE HOME FLOOR, WALL AND CEILING/ROOF MUST BE MAINTAINED.

Approved Chimney - Your stove is approved for use with Class A, UL 103 HT (U.S.) / ULC-S629 (Canada) Listed Residential Type and Building Heating Appliance Chimney (HT chimney - 2100° Fahrenheit) and double wall connector pipe. Approved chimney brands are Security Chimneys™, Jakes Evans/GSW, Dura-vent, Metal Fab, Ameri-Tec, Metalbestos and Industrial Chimney (ICC).

Clearances to connector shall be measured from 6" flue collar. Restrictions apply! Read instructions before installing.

YOUR CHIMNEY INSTALLATION MUST COMPLY WITH LOCAL BUILDING AND FIRE CODES.

Double Wall Pipe
Using 6" Diameter Type L-Vent Connector Pipe
Mobile (Manufactured) Home Installation Shown

INSTALL VENTING SYSTEM PER VENT MANUFACTURERS INSTRUCTIONS!

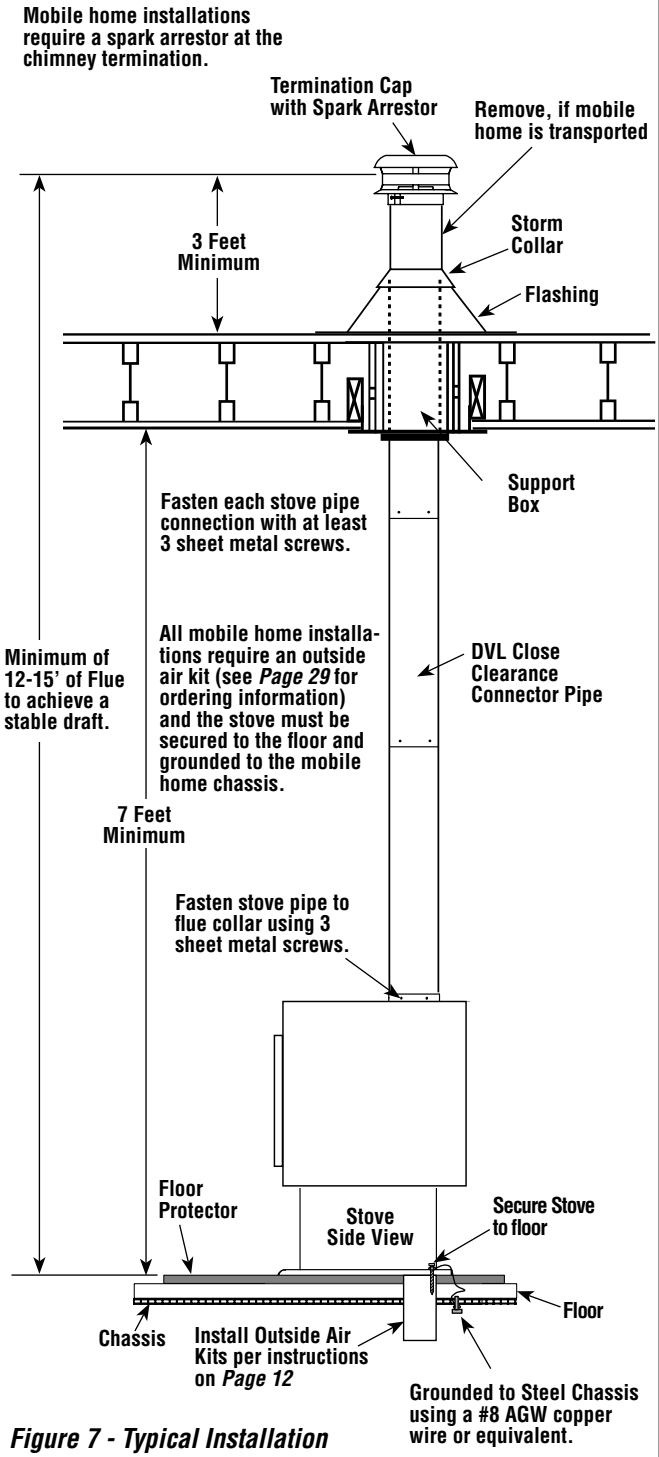


Figure 7 - Typical Installation

NOTE: DIAGRAMS & ILLUSTRATIONS ARE NOT TO SCALE.

Chimney Connector Systems and Clearances from Combustible Walls for Residential Heating Appliances (NFPA 211) Refer to ***Figure 8***

System A. Minimum 3.5 in. (90 mm) thick brick masonry wall framed into combustible wall with a minimum of 12 in. (305 mm) brick separation from clay liner to combustibles. Fireclay liner (ASTM C 315, Standard Specification for Clay Flue Linings, or equivalent), minimum 5/8 in. (16 mm) wall thickness, shall run from outer surface of brick wall to, but not beyond, the inner surface of chimney flue liner and shall be firmly cemented in place.

Clearance: 12 in. (305 mm)

System B. Solid-insulated, listed factory-built chimney length of the same inside diameter as the chimney connector and having 1 in. (25.4 mm) or more of insulation with a minimum 9 in. (229 mm) air space between the outer wall of the chimney length and combustibles.

The inner end of the chimney length shall be flush with the inside of the masonry chimney flue and shall be sealed to the flue and to the brick masonry penetration with non-water-soluble refractory cement. Supports shall be securely fastened to wall surfaces on all sides.

Fasteners between supports and the chimney length shall not penetrate the chimney liner.

Clearance: 9 in. (229 mm)

System C. Sheet steel chimney connector, minimum 24 gauge [0.024 in. (0.61 mm)] in thickness, with a ventilated thimble, minimum 24 gauge [0.024 in. (0.61 mm)] in thickness, having two 1 in. (25.4 mm) air channels, separated from combustibles by a minimum of 6 in. (152 mm) of glass fiber insulation. Opening shall be covered, and thimble supported with a sheet steel support, minimum 24 gauge [0.024 in. (0.61 mm)] in thickness.

Supports shall be securely fastened to wall surfaces on all sides and shall be sized to fit and hold chimney section. Fasteners used to secure chimney section shall not penetrate chimney flue liner.

Clearance: 6 in. (152 mm)

System D. Solid-insulated, listed factory-built chimney length with an inside diameter 2 in. (51 mm) larger than the chimney connector and having 1 in. (25.4 mm) or more of insulation, serving as a pass-through for a single wall sheet steel chimney connector of minimum 24 gauge [0.024 in. (0.61 mm)] thickness, with a minimum 2 in. (51 mm) air space between the outer wall of chimney section and combustibles. Minimum length of chimney section shall be 12 in. (305 mm). Chimney section concentric with and spaced 1 in. (25.4 mm) away from connector by means of sheet steel support plates on both ends of chimney section. Opening shall be covered, and chimney section supported on both sides with sheet steel supports of minimum 24 gauge [0.024 in. (0.61 mm)] thickness.

Supports shall be securely fastened to wall surfaces on all sides and shall be sized to fit and hold chimney section. Fasteners used to secure chimney section shall not penetrate chimney flue liner.

Clearance: 2 in. (51 mm)

Additional requirements:

1. **Insulation material used as part of wall pass-through system shall be of noncombustible material and shall have a thermal conductivity of 1.0 Btu-in./hr-ft² - ºF (4.88 kg-cal/hr-m² - ºC) or less.**
2. **All clearances and thicknesses are minimums; larger clearances and thicknesses shall be permitted.**
3. **Any material used to close up an opening for the connector shall be of noncombustible material.**
4. **A connector to a masonry chimney, except for System B, shall extend in one continuous piece through the wall pass-through system and the chimney wall to the inner face of the flue liner, but not beyond.**

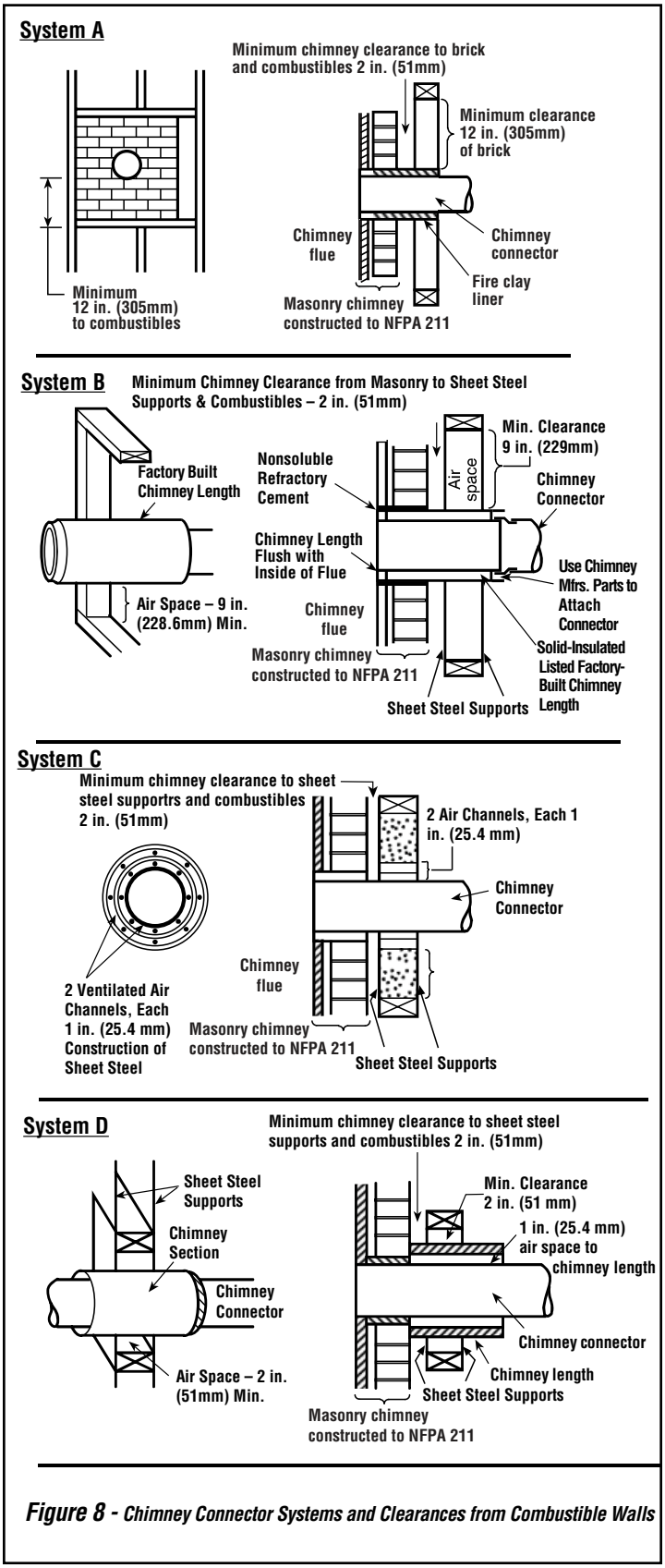


***Figure 8** - Chimney Connector Systems and Clearances from Combustible Walls*

NOTE: DIAGRAMS & ILLUSTRATIONS ARE NOT TO SCALE.

LEG AND HEATSHIELD INSTALLATION

NOTE: *The threaded rods used to bolt the legs to the stove are packaged with the heatshield, as a heatshield is required when a stove is installed on legs.*

Residential and Mobile Homes

(Bolting down and grounding of stove are required only in mobile homes).

Open all cartons, if any and remove the contents upon receipt and check for any damaged or missing parts. If there is hidden damage, notify your freight company or IHP dealer immediately.

CAUTION: Wear gloves during installation in case of sharp edges on the stove.

Leg Installation

1. Carefully place stove on it's back. Be careful not to scratch the stove, use a piece of cardboard or carpet to protect the back of the stove.
2. Mount all four legs as shown in ***Figure 9***.
3. First, screw the threaded rods into the holes at the four corners on the bottom of the stove. Screw the threaded rods into the firebox three full rotations or 3/16 to 1/4", (if the rear rods are screwed in too far they will lift the bricks off the bottom of the stove). Use a washer and nut to secure the leg. Be sure the legs are mounted squarely on the firebox bottom. Tighten nuts securely.
4. Use the two bolts and washers provided with the heatshield kit to mount the heatshield as shown in ***Figure 10***.
5. Do not over tighten the heatshield mounting bolts as it may bend the heatshield.

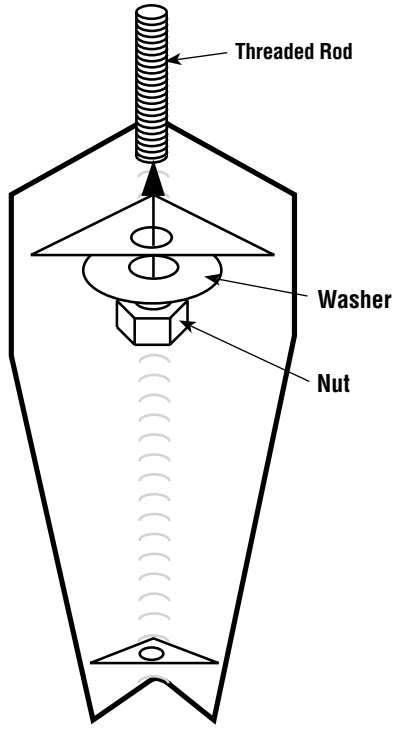


Figure 9

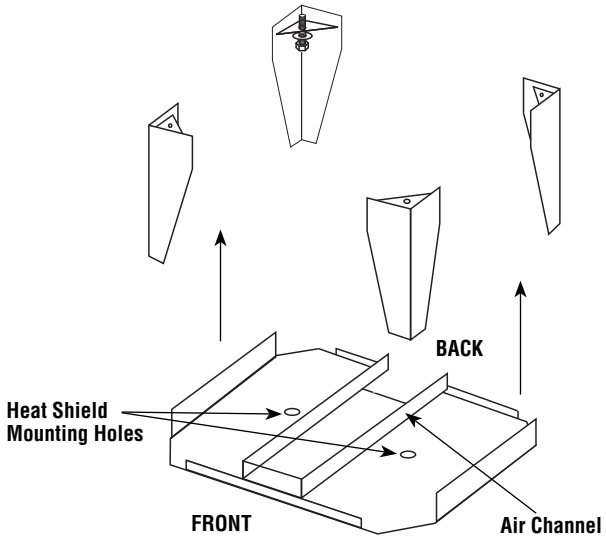


Figure 10

OUTSIDE AIR KIT INSTALLATION

To install the "Outside Air Kit," position the clip so that the nut is directly above the hole punched in the back of the heatshield (See ***Figure 11***). Install the outside air adapter box on the stove by sliding it into the air channel located between the bottom heatshield and the stove bottom until the oblong ring is approximately 1/4" from the rear edge of the lower heatshield. Make sure the ring is facing down. Thread the 1/4" bolt up through the nut in the clip until snug against the adapter box.

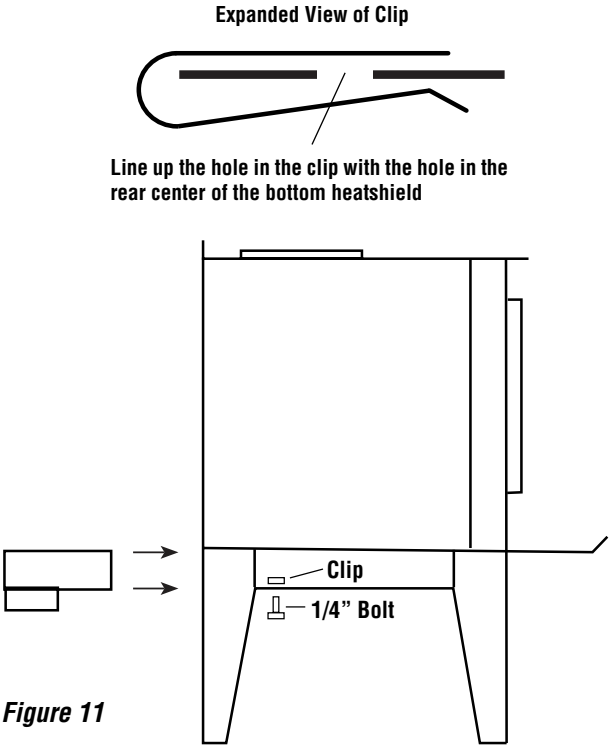


Figure 11

To locate the hole in the hearth for outside air, mark a 4" circle on the hearth. The circle's center should be 2-3/4" directly back from the center of the flue outlet and 5/8" to the left side.

STOVE INSTALLATION

1. If not previously installed, install floor protection and move the heater into the desired location.
2. Position the stove on your floor protection in the exact location where it is to be located, making sure all minimum clearances are met.
3. If you are installing outside air on your stove, mark a 4" circle on the floor protection just below the oblong ring. When cut out, this hole will accommodate the flexible outside air tube.
4. If the stove is to be fastened to the floor, locate the hold down brackets inside the leg box and mark the floor protection below the holes in the brackets.
5. If you are installing outside air on your stove, remove the stove and cut the floor protection and the floor where the 4" air tube circle had been previously drawn. If the stove is to be fastened to the floor, drill 1/2" holes through the floor protection only, at the marks that were for fastening the stove to the floor if so desired. Slip the flexible outside air tube through the hole in the floor, leaving 1" of tube above the floor protector surface, using tape to hold it in place.
6. Place the stove on the floor protection so that the previously cut or drilled holes line up. Attach the stove to the floor with the lag bolts if so desired.
7. If you are installing outside air on your stove, place the hose clamp over the flexible air tube and slide the tube up over the 4" ring on the outside air adaptor box and tighten the hose clamp. Push the outside air adaptor forward 1/4" until full contact is made with the lower heatshield. Tighten the 1/4" bolt until the adaptor box is held firmly in place. Use silicone sealant to create a seal between the flexible air tube and your floor protection.
8. If it is necessary to level, secure, or ground your stove, use the holes in the bottom of the leg for those applications. To level the stove on Olympic cast legs, locate the front leg that is not touching the hearth pad. Insert the allen head screw through the slotted washer (supplied with the legs) and into the threaded hole in the bottom of the leg. See the drawing to the right. Push the slotted washer down until it touches the hearth pad and then tighten the screw into the leg. Should any other leg not be resting on the hearth pad, install a washer and screw in that leg as well.
9. Install bricks and baffle as per instructions on ***Pages 15 and 16***. It is highly recommended that the baffle be assembled before the chimney is installed so that the baffle blankets can be adjusted into place through the flue collar.
10. If installed into a mobile home, the stove shall be grounded to the mobile home chassis with a #8 AGW copper wire or equivalent.
11. For residential installations, install the first section of stove pipe with the crimped end going down inside the flue collar on the heater. Continue with your stove pipe, installing each section-crimped end down. Make the final connection to your chimney. Your dealer carries the necessary pipe and fittings to connect to the various listed factory-built chimneys. **YOUR CHIMNEY INSTALLATION MUST COMPLY WITH LOCAL BUILDING AND FIRE CODES.**
12. Be sure to fasten each stove pipe connection with at least 3 sheet metal screws.
13. Install chimney as per manufacturer's instructions. Some brands of pipe may require removal of the spacer ring in the flue collar.
14. All horizontal runs of pipe should be as short as possible and are required by NFPA No. 211 to have an upward pitch or rise in the same direction the smoke travels of no less than 1/4" to the linear foot. The connector pipe must meet minimum clearances in any direction to walls or other combustible materials. It must attach to a listed double wall metal chimney at least 6" in diameter or to a masonry chimney with a flue passage of at least 48 square inches.
15. It is required that a chimney connector pipe not extend further than the inner wall of the flue when it is connected to a masonry chimney and that it either be cemented to the masonry or be installed without cement in a thimble connected to the masonry wall. When the connector is inserted into a thimble, the joint must be tight enough so that it will not be dislodged in normal use. Install connector at no less than the minimum clearances from the ceiling when using a 90-degree elbow to pass through combustible constructions.
16. Chimney connector pipes should never pass through a floor, ceiling, fire wall, partition, or combustible construction of any type unless certain precautions are taken. The best method is to use a listed thimble and a listed chimney in accordance with the manufactures directions. NFPA No. 211 gives approved methods for passing a flue pipe through combustible constructions.

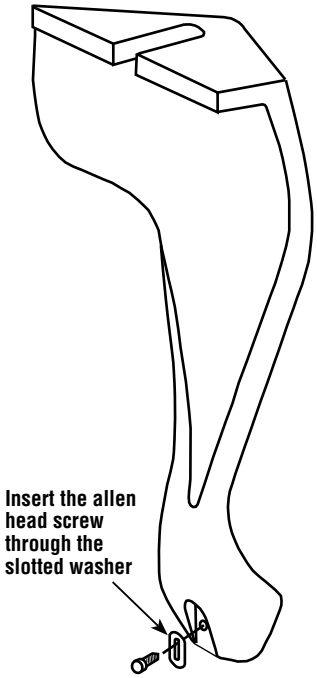


Figure 12

NOTE: DIAGRAMS & ILLUSTRATIONS ARE NOT TO SCALE.

PEDESTAL INSTALLATION

(For ash drawer pedestal see instructions included with pedestal)

Residential and Mobile Homes

(Bolting down and grounding are required only in mobile homes)

CAUTION: Wear gloves during installation in case of sharp edges on the stove.

1. Remove the heater from the carton, if packaged, upon receipt and check for any damaged or missing parts.
2. Carefully put the stove on pedestal with the open end of the pedestal facing the rear. **DO NOT LEAVE THE STOVE UNATTENDED UNTIL IT IS BOLTED SECURELY TO THE PEDESTAL.**
3. Line up the holes in the brackets on the pedestal with the threaded holes in the bottom of the stove. Use the two 1/2" long bolts and 3/8" standard washers to bolt the stove to the pedestal. **Be sure to see that the stove is mounted squarely on the pedestal before tightening the two bolts securely.**
4. When installing a pedestal on this stove you **MUST** plug the four leg mounting bolt holes, located on the bottom of the stove in the four corners, with the bolts that were used to mount the shipping legs. **The two rear bolts should not be installed more than two full rotations to prevent lifting the bricks off the bottom of the stove. FAILURE TO INSTALL THESE FOUR BOLTS PROPERLY WILL RESULT IN REDUCED CONTROL OF THE STOVE'S COMBUSTION SYSTEM!**

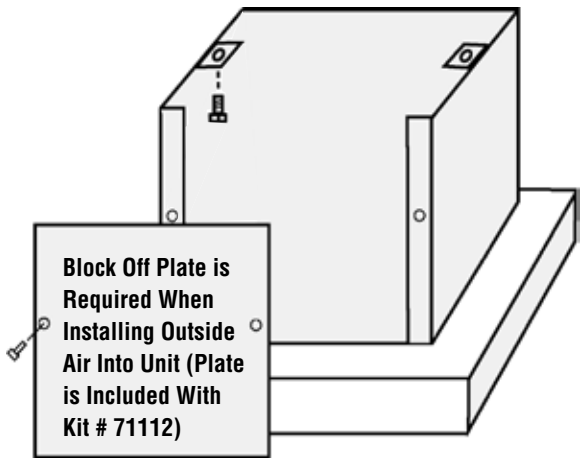


Figure 13

5. If required, install the Outside Air Kit (P/N 71112) as per the following instructions. To locate the hole in the hearth for outside air mark and cut a 4" (102 mm) hole in the hearth. The hole's center should be 3" (76 mm) directly forward from the center of the flue outlet or locate as per the following instructions.
6. Position the stove on your floor protection in the exact location where it is to be located, making sure all minimum clearances are met. Mark the floor protection where the pedestal will be located, then remove the stove.
7. Make four 1-1/2" (38 mm) cuts in one end of the corrugated tube and fold the flaps back. Cut a 4" (102 mm) hole through the floor protection and the floor and insert the corrugated tube into the hole. Cover it with the supplied screen and fasten it to the floor protector.
8. Locate the 11-1/2" x 14" (292 mm x 356 mm) metal plate and paint to match the stove if necessary. Position this piece so that the 14" (356 mm) dimension evenly overlaps the lips on the back of the pedestal (see drawing below). Attach this plate to the back of the pedestal with the self-tapping screws supplied.
9. If the stove is to be fastened to the floor, attach the stove with the supplied lag bolts, through the pedestal base on opposite sides, attaching them into the floor beneath the floor protection. Seal any irregularities with silicone sealer.
10. If installed in a mobile home, the heater shall be grounded to the chassis with a #8 AGW copper wire or equivalent.
11. Install bricks as per instructions on ***Pages 15 and 16***. It is highly recommended that the baffle be assembled before the chimney is installed so that the baffle blankets can be adjusted into place from the flue outlet.
12. Install chimney as per manufacturer's instructions.

POST INSTALLATION CHECKS

1. Check that all chimney pipe joints are securely fastened.
2. Check that the heater is securely fastened to the floor (if applicable).
3. Make sure the intake vent has clear access to outside air (if applicable).
4. Make sure the outside air vent has been sealed properly to keep rodents out (if applicable).
5. Be sure all roof flashings are watertight.
6. Be sure the stove is properly grounded (if applicable).

FOR YOUR OWN PROTECTION AND INSURANCE PURPOSES, HAVE YOUR CHIMNEY AND CONNECTOR PIPE INSTALLATION INSPECTED BY YOUR LOCAL BUILDING CODE AUTHORITY OR FIRE MARSHAL BEFORE STARTING A FIRE IN YOUR STOVE. NOTIFY YOUR INSURANCE COMPANY.

BRICK INSTALLATION

CAUTION: Wear gloves during brick installation in case of sharp edges inside the stove.

NOTE: *Installation of the baffle boards and baffle blankets are easier when you can still access the flue outlet, (before connecting the flue vent).* ***Be sure the baffle blankets are placed flat on the baffle boards so as not to block exhaust flow to the flue.*** *Use a ruler or a piece of kindling to reach over the baffle blanket to be sure it is completely flat on top of the baffle boards.*

Measure bricks before installing, as per list of dimensions on next page, to be sure the correct bricks are installed in the correct location.

1. Install bricks #1-26 in the numbered sequence shown in ***Figure 14*** on ***Page 16***.

   NOTE: *Before installing your baffle boards make sure the stainless steel tube support and front and rear tube hangers are centered side to side and that the front and rear hangers are hooked onto the stainless steel pins protruding from the rear of the airwash and the stove back.*

2. Next, you will install the baffle boards. All 4 baffle boards included are the same size. You will start by installing the boards in the center part of the unit on top of the secondary tubes to each side of the baffle support with the 15" side of the baffle board going from the front to back of the unit. Once you have the first two boards installed slide the board to the left side of the baffle support all the way to the left and rear of the unit. You will slide the board to the right side of the secondary support to the right and rear of the unit. Next you will install the two remaining boards where you originally installed the first two boards on each side of the baffle support and pushed against the rear of the unit. The stainless steel support hanger should be centered left to right between the sets of baffle boards and placed as shown in ***Figure 15 on Page 16***.

3. Also included with the unit are two 15” x 10” x 1” thick baffle blankets. Install each blanket above the baffle board to each side of the secondary support with the 15” side of the blanket from front to rear of the unit. Make sure that the baffle blankets are to the full rear of the unit.

CAUTION: Make sure the baffle blankets are down flat on the baffle boards, pulled together in the center so that no gaps exists between them and do not protrude beyond baffle boards. It is critical that baffle boards and baffle blankets are fully against the rear of the unit.

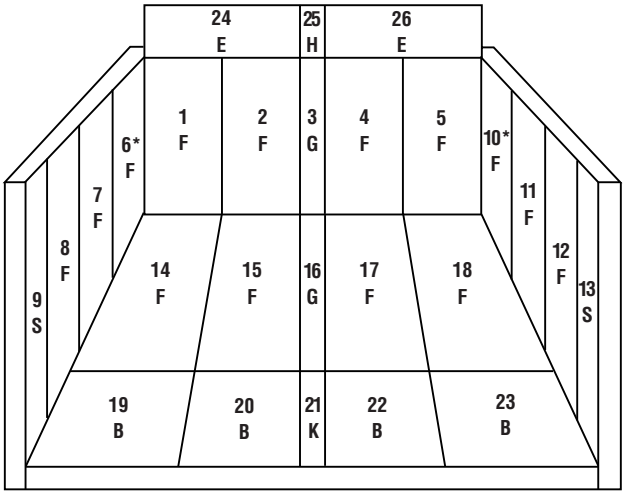
These brick sizes may be slightly smaller to adjust for steel and firebrick tolerances beyond our control. Be sure to measure and mark bricks with their numbers when removing.

WARNING: IF THE BRICKS ARE NOT INSTALLED EXACTLY AS SHOWN BELOW, THEY COULD FALL OUT OF PLACE DURING REFUELING OR BURNING OF THE STOVE CAUSING SERIOUS INJURY.

Brick Sizes

B = 4-1/2”x 5-1/2”
E = 3”x 9”
F = 4-1/2”x 9”
G = 1-1/2”x 9”
H = 1-1/2”x 3”
K = 1-1/2”x 5-1/2”
S = 2-1/8”x 9”

Firebox Brick Layout as Viewed from the Front



*** Bricks 6 and 10 fit up against the back of the firebox.**

Figure 14

Side Cut-A-Way View of Firebox

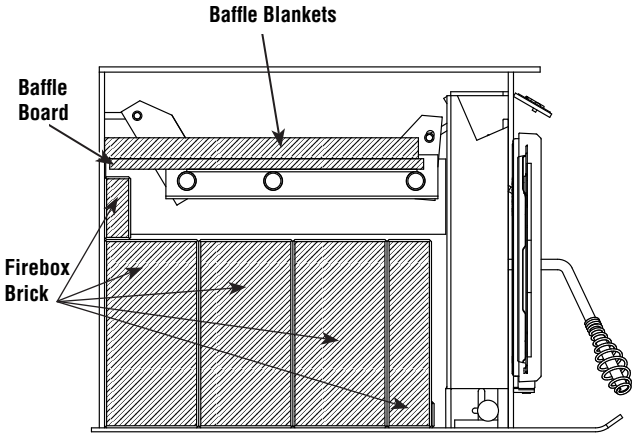


Figure 15

Baffle Insulation Parts

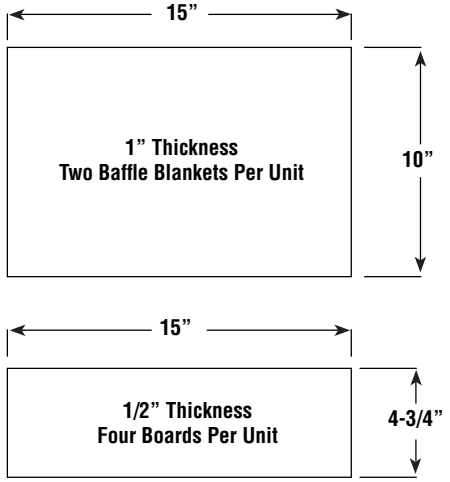


Figure 16

NOTE: DIAGRAMS & ILLUSTRATIONS ARE NOT TO SCALE.

OPERATING HINTS

1. Burn only dry, well-seasoned wood for maximum heat output. In some states it is illegal to burn wet wood or anything other than clean, dry wood products.
2. Your stove or fireplace insert is designed to operate with the door closed! Operate only with the door shut tightly at all times except when loading wood and possibly on start up to establish a draft. Never leave the unit unattended while the front door is slightly opened.
3. **DO NOT** hit or move the baffle boards while loading wood. Occasionally check the baffle. Make sure the baffle blankets are always flush with the front of the baffle boards. Loading oversized logs may dislodge the baffle boards.
4. **CAUTION: THE DRAFT CONTROL MUST BE FULLY OPEN BEFORE OPENING THE DOOR TO AVOID POSSIBLE COMBUSTION FLASH!!** (Ignition of hot volatile gases as the door is opened).
5. Feeding excessive amounts of fuel to the appliance should be avoided. It is important to supply it with sufficient draft and fuel to maintain a moderately hot fire. If, during overnight burns, heavy creosote deposits develop inside your stove and on the door, the draft is set too low - review your burning habits!

⚠ WARNING

Be careful not to abuse door assembly by striking or slamming it. If the door assembly or glass is broken or damaged, they must be replaced with factory original parts before heater can be safely operated. Use only components provided by the manufacturer as replacement parts.

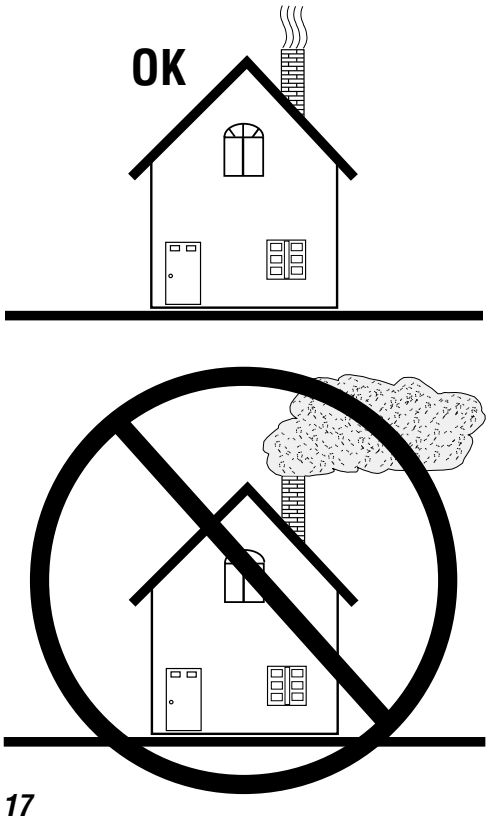


Figure 17

STARTING AND MAINTAINING A FIRE

Be sure to clean plated accessories with a household type cleaner and a very soft cloth to remove any fingerprints and residues prior to the first fire.

1. **NEVER USE FLAMMABLE LIQUIDS TO START OR REKINDLE A SOLID FUEL FIRE!!**
2. Fully open the primary draft control by pulling the 1" plastic knob out on the left side (lower front corner) until it stops (away from the stove). This control determines the amount of air entering the stove. Pushing it toward the stove reduces the burn rate in the firebox. For your convenience, the rod on this control is marked with four grooves to assist you in obtaining repeatable burn rates.
3. Place a small amount of crumpled paper in front of the firebox and cover it with a few pieces of kindling.
4. Light the paper and allow sufficient time for the kindling to become fully engulfed in flames. You will now close the wood units front door. (Your wood units front door may or may not need to be left slightly open during this start up process, this depends on the appliance model and the amount of draft present. Do not leave the unit unattended while the front door is slightly open) Once kindling is burning well, larger pieces of wood may be added, then the door should be fully closed if there was the need to keep it slightly open during start up.

   DO NOT LEAVE THE STOVE UNATTENDED WHILE THE FRONT DOOR IS SLIGHTLY OPEN.

   CAUTION: Do Not alter the adjustment range of the draft control for increased firing for any reason.

   Operate only with fuel door and ash drawer closed. Maintain all seals in good condition. Do not operate with broken glass.

   Do Not build the fire too close to the glass.

   Do not operate the appliance with the door open or ajar other than possibly during start up to create a draft (Do not leave the unit unattended while the front door is slightly open during start up). Operating the appliance with the door open other then in initial start up if needed will produce extreme temperatures within the appliance. Damage caused from over-firing is not covered under the manufacturers limited warranty.
5. When operating any wood burning appliance, it is important to become familiar with how the damper control affects heat output and the overall temperature of the appliance. A stove thermometer can be a helpful tool to help ensure you are not over-firing your appliance and it will also ensure you are burning fuel at a rate that is most efficient. Place a stove thermometer on the top of the appliance. Monitor the temperature every 15 minutes or so until you become more familiar with your appliance. Close the damper all the way down if you begin to reach 500 degrees, as this is a sign that you are operating your appliance at too high a temperature.
6. For best results, use smaller pieces of wood to get the appliance temperature very high before loading larger wood for sustained burns. If necessary, crack the door to allow ignition of the fuel charge. **Do not leave the unit unattended while the front door is slightly open**. Now you can add larger pieces of wood and after several minutes of high burn, set the left control for the desired heat output. Check the exhaust in about 15 to 20 minutes. Large amounts of smoke indicate an improper burn setting (either too high or too low). Adjust and recheck in 5 to 10 minutes.

NOTE: DIAGRAMS & ILLUSTRATIONS ARE NOT TO SCALE.

BLOWER OPERATION

Blower Operation

The blower can be operated manually or automatically (blower will turn on when the stove is hot and turn off when the stove is cool).

The rocker switch on the control panel allows you to select between manual operation or automatic operation as follows (see ***Figure 19***):

— **MANUAL OPERATION:** Turn rocker switch to the "MANUAL" position and adjust rheostat knob to the desired speed. The blower will have to be manually turned "OFF" by rotating the rheostat knob clockwise until it clicks.

═ **AUTO OPERATION:** Turn rocker switch to the "AUTO" position and the rheostat to the ON position (rotate rheostat knob counterclockwise until it clicks). When the stove or insert warms up, the blower will automatically turn on (adjust rheostat knob to the desired speed setting). When the stove or insert cools down, the blower will automatically turn off.

Rheostat Operation - The highest blower speed is obtained by turning the rheostat knob counterclockwise until it clicks "ON", then rotate towards "HIGH" to increase blower speed. Rotate the knob clockwise for a lower speed. To turn off, continue to rotate the knob clockwise until it clicks "OFF."

Blower Operation Guidelines

While in auto operation mode, the blower will turn off and on based on the temperature of the appliance. Auto operation ensures there is sufficient heat build-up to warm the air being moved by the blower before the blower is turned on. Likewise, when the appliance cools off, the blower is turned off to prevent circulating cool air. Depending on the size and intensity of the fire it may be necessary to adjust the blower speed accordingly to ensure uninterrupted blower operation. For example a small fire may require a slower blower speed to keep the heat output by the blower consistent. If the blower is operated in manual mode, it may be necessary to adjust the blower speed as the fire begins to burn down and the appliance is no longer hot enough to effectively heat the air moved by the blower. If the air coming from the blower feels cool, one should either decrease the blower speed or stoke the fire to build up more heat.

NOTE: Turn blower off before opening the door to load the fuel.



Figure 19 - Blower Controls

⚠ WARNING

The blower must be plugged directly into a properly grounded three-prong receptacle, 120 VAC, 60 Hz, single phase. Do not cut or remove the grounding prong from this plug. Do not route power cord under or in front of appliance.

Installation must be in accordance with National Electrical Code, ANSI/NFPA 70 - latest edition. In Canada, the current CSA C22.1 Canadian Electrical Code - latest edition.

DANGER: Disconnect power before servicing blower.

In the event that you remove the blower for any reason, make sure a cover plate (available from IHP) is installed before using the heater. Excessive rear wall temperatures will result if the stove is burned without the cover plate. The cover plate is not necessary if a blower has never been installed because a knock-out will be in place to act as the cover.

Blower Wiring Schematic

NOTE: SWITCH CONDITIONS GIVEN AT ROOM TEMPERATURE

N/C = NORMALLY CLOSED
N/O = NORMALLY OPEN

= FEMALE DISCONNECT
= MALE DISCONNECT
= STUD CONNECTION

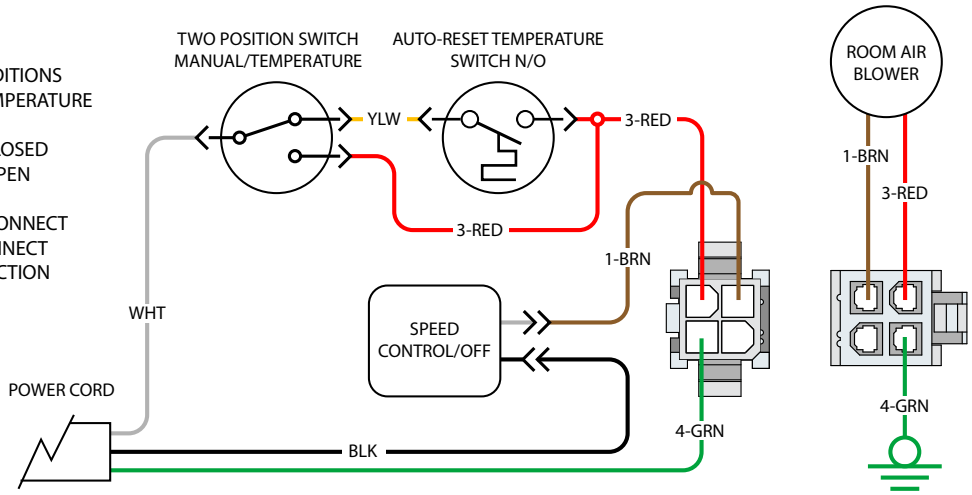


Figure 18

NOTE: DIAGRAMS & ILLUSTRATIONS ARE NOT TO SCALE.

OPERATING TECHNIQUES AND HINTS

Recent developments in wood burning technology have made wood burning a cleaner and more convenient way to heat your home. Overall efficiency in a wood burning appliance is a combination of combustion efficiency and heat transfer efficiency. Whether heating your entire home or just a room or two, your understanding of how to best operate your stove or insert will enhance its overall efficiency and performance. What this can mean to you is longer, cleaner burns, less wood use and more heat.

GETTING THE MOST OUT OF YOUR STOVE

The following sections will outline techniques you can use to "get the most out of your stove." Please read them carefully.

MAXIMIZING YOUR STOVE'S OVERALL EFFICIENCY

It is important to know that for high, combustion efficient, clean burns, you will need to have sufficient temperatures inside the firebox for thorough combustion. The best method for determining if you have sufficient temperatures is to watch the brick lining in your firebox. When you first light your stove or fireplace insert, the firebrick will turn a dark brown or black. After 20 to 30 minutes of a hot fire, most of the bricks should return to near their original light brown or yellow color. This means the firebrick have reached a high enough temperature for your stove to achieve high combustion efficiency.

Second and just as important, is achieving a high level of heat transfer efficiency. Slowing the rate of flow through the stove or insert enhances heat transfer, thus allowing more time for heat to be transferred into your home. To do this, be sure to thoroughly preheat your stove and then reduce the amount of primary air by closing the draft control (lower left) to about 1/2 to 3/4 open. This will decrease the excess oxygen in your flue, which carries heat up your chimney, but should still be enough air to allow the stove to produce its maximum heat output. (More air may produce a slightly greater amount of heat, but will greatly increase wood consumption). When the area being heated reaches a comfortable temperature, slow the burn rate by closing the control to further improve heat transfer.

To get the most out of your appliance, you will need to combine good combustion efficiency with good heat transfer practices. The following are some tips on how to operate your stove to achieve the highest overall efficiency.

1. Thoroughly preheat your stove before slowing the burn rate by closing the draft control.
2. Measure the stove temperature at the hottest point on the stove top or face. Use this information to repeat burn rates.
3. Once preheated, add wood (if needed) and partially close the draft control (lower left).
4. Operate your stove as much as possible in the low to medium burn ranges.
5. Do not lower the draft setting so low as to completely extinguish the flames in the firebox. Check for at least some small flames twenty minutes after setting the draft control.
6. Do not continually operate your stove or fireplace insert in the high (wide open) setting. This wastes wood by carrying a great deal of heat up the chimney and can damage your stove or fireplace insert and chimney.
7. Go outside and check your chimney. More than a very small amount of smoke indicates wasted heat, creosote build up and pollution.

ACHIEVING CLEAN, LONG BURNS

To achieve long burn times, after having thoroughly preheated the appliance, let the stovetop cool down to 275 to 400 degrees (on Elites, locate thermometer on the face of the insert just above the door). Now load the firebox and set the draft control. At this point, you may need to burn the stove with the draft open for a few minutes to ignite the wood. All IHP stoves are EPA tested for emissions at low burn with the air control completely closed. Whether or not you should burn your stove with the air control completely closed will depend on the following factors:

* How you load your wood
* Your chimney type, height and draft
* Your wood type and its moisture content
* The temperature of the appliance
* Which model stove or insert you have

Experiment with different loading configurations to achieve longer burns. Try loading the wood from side to side and nesting it in the ashes to prevent airflow under and around the wood. Fresh wood should be loaded to the back of the firebox or to the sides. Hot coals or half burned wood should be brought towards the front of the firebox. The way you load your wood can seriously affect burn times. If the new load does not ignite within a few minutes, try crisscrossing the load to allow more airflow around the fire, or try a slightly hotter stove temperature.

Determining the lowest setting for efficient low burns. This will require some experimentation on your part. Try closing the air control all the way with the stove temperature at 325 to 350 degrees. If the flames are completely extinguished, open the air control halfway and then slowly close it until there is only a small amount of flame. It is important to check the stove about 20 minutes after setting the draft control as it takes this long for the stove temperature to stabilize. There should still be some small flames on or above the wood load.

Use 325 degrees as a starting point. You can try starting temperatures 25 degrees higher or lower to achieve desired burn times, start 25 degrees lower if the stove burns the wood too quickly or 25 degrees higher if there are no flames in the firebox for more than a few minutes after loading the wood. You may or may not need to burn the stove with the air control open for a few minutes prior to setting the draft for a low burn, this will depend on the factors mentioned above. **Be sure not to smolder a fire overnight. Check your chimney for large amounts of smoke as this indicates very poor combustion.**

It is important to realize that stove technology has changed. Stoves have changed a great deal in the last few years. This has led to substantial changes in the methods of operation in new stoves as compared to older stoves. In old stoves without full brick linings and ceramic insulation, the rule was "get the stove as hot as possible before setting the draft on low for overnight burns." On newer, high technology stoves, this is not necessary. Although it is still important to have the stove hot enough to burn efficiently, it will require less preheating. Once you have determined your optimum operating temperatures for various burn rates, we believe you will find your stove an extremely convenient way to achieve your heating needs.

Do not reload the stove for long burns when the stainless secondary tubes or baffles are glowing red, or when the stove is uncomfortably hot to load. This indicates the stove is too hot to load for a long burn. Also, do not load wood for a long burn on a deep bed of hot coals. Try stirring the coals a few minutes before loading the stove for a low burn to allow some of the unburned coals time to burn.

MAINTENANCE

Have your product inspected at least once a year by a qualified service technician to ensure gaskets, air tubes, baffles, and venting are in good repair to ensure proper performance. Have degraded items replaced by a qualified service technician.

THIS WOOD HEATER NEEDS PERIODIC INSPECTION AND REPAIR FOR PROPER OPERATION. IT IS AGAINST FEDERAL REGULATIONS TO OPERATE THIS WOOD HEATER IN A MANNER INCONSISTENT WITH OPERATING INSTRUCTIONS IN THIS MANUAL.

DOOR HINGES: If door hinges need lubricating, use an anti-seize compound (never use oil) available from your IHP dealer.

DOOR LATCH: If your door latch fails to latch tightly and the gasket is in good condition, place a length of pipe (cheater bar) over the inside portion of the door handle and bend slightly toward the door until the proper adjustment is obtained. If the door handle does not close easily, apply high temperature anti-seize to the striker.

DOOR GASKET: Periodically check gasket to make sure it is not overcompressed. If compressed, replace with a special woven Door Rope. (Don't try substituting rope, only use special IHP Door Rope).

PLATED ACCESSORIES: Clean only with household type glass cleaner and a very soft cotton cloth. Other products may damage plated finish, paint and gaskets.

BAFFLE BLANKET: Your baffle blankets should be inspected during every chimney cleaning. If the baffle blanket is compressed or heavily stained, it should be replaced. Heavy creosote stains or matting is an indication of improper use and your burning habits should be reviewed.

GLASS CLEANING: Only clean glass with products specifically made to use on wood stoves. Other products could damage gaskets and paint. Never scrape glass with a razor blade. This can pit the glass and make it impossible to clean in the future.

WINDOW GASKET: The window gasket can be checked by running the flame of a match near the gasket and around the door. If the flame is drawn in around the window, the gasket should be replaced.

DOOR HANDLE: Door handle may become tight as you use the stove. Free the handle up by using dry graphite supplied with the stove. The directions are included with the graphite.

⚠ WARNING

Inspect and clean chimney and connector frequently. Under certain conditions of use, creosote buildup may occur rapidly.

MAINTENANCE

GLASS REPLACEMENT INSTRUCTIONS

Step 1. **Remove Door Assembly** - Open door to remove E clip from the upper hinge pin. Remove upper hinge pin by pulling up while holding the opposite side of the door. Lift door out of the lower hinge pin and place face down on a soft surface.

Step 2. **Remove Door Back Screws (6 ea.)** - Using a 5/32" allen wrench remove the 6 retainer screws from the faceplate. To locate screws, peel back the door gasket as necessary.

Step 3. **Disassemble Door Assembly** - Flip door assembly over to be face up. Separate faceplate from door back by pulling up on faceplate.

Step 4. **Remove Glass** - Carefully remove broken glass one piece at a time (protective gloves are recommended)

Step 5. **Install New Glass Assembly** - Install the new glass with gasket in recess on door back (use only factory supplied 5mm ceramic glass. Do not substitute).

Step 6. **Reinstall Faceplate and Screws** - Reinstall faceplate onto door back and while holding the door assembly together flip the assembly back onto it's face. Carefully reinstall the screws. Be very careful not to overtighten the screws (this could result in glass breakage when the appliance is hot) and it is highly recommended to use anti seize on the screws.

Step 7. **Reinstall Door** - Set door assembly back into the lower hinge mount while holding the handle side of the door up. Place the upper hinge pin back in the mount and door assembly. Reinstall the E clip that was removed.

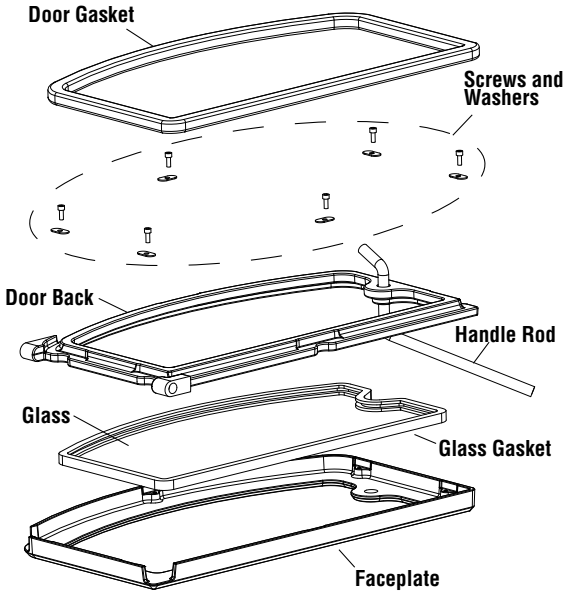


Figure 20

GLASS CLEANING GUIDELINES

WARNING: DO NOT CLEAN GLASS WHEN APPLIANCE IS HOT!

Glass on any wood stove or fireplace insert will not stay perfectly clean. Here are some guidelines for cleaning and caring for the glass:

- Ensure the appliance is cold prior to cleaning glass.
- This appliance is designed to provide a flow of air over the inside of the glass, where along with high heat helps inhibit build-up on the glass. When build-up occurs, a commercial glass cleaner designed for stoves is recommended. Regular household glass cleaners will not clean creosote.
- Do not use abrasives such as steel pads, steel wool or oven cleaner as they will scratch the glass. Never scrape glass with a razor blade as this may pit the glass and make it impossible to clean in the future.
- Do not use chemical glass cleaners as they may damage the gaskets or painted surfaces.

TIPS FOR KEEPING THE GLASS CLEAN

- Burn only dry seasoned cord wood. **Wet wood = Dirty glass.**
- A short, hot fire (15 - 20 minutes) may help to clean off some of the normal buildup. **Lower burns = more build-up. Higher burns = less build-up.**
- Keep freshly loaded wood away from the glass.
- After reloading, allow all the wood to catch flame before dampering down the appliance.

⚠ CAUTION

Cleaning Glass: Ensure appliance is cold prior to cleaning glass. A commercial glass cleaner designed for stoves is recommended. Do not use abrasive cleaners. Do not clean with any materials, which may scratch or otherwise damage the glass. Scratches on the glass can develop into cracks or break. Inspect the glass regularly. If you detect a crack, extinguish the fire and contact your dealer for a replacement.

TROUBLESHOOTING

Problem	Solution
POOR DRAFT:	Extend chimney in length or have the chimney realigned to the proper size flue. Oversized chimneys normally have poor drafts. Remember, the appliances' draft depends solely on the natural draft of the chimney (See Draft Requirements on ***Page 4***). If your stove or fireplace insert is not drafting properly, your chimney is the problem. All stoves are thoroughly tested to ensure proper draft with the correct size chimney flue.
EXCESSIVE DRAFT:	With better chimneys being more common, excessive draft can be an issue. Alleviate excessive draft by slowing the burn rate of the appliance once it has reached proper operating temperature (See Maximizing Your Stoves Overall Efficiency on ***Page 19***).
DIRTY GLASS:	1) Burn smaller, hotter fires and check to make sure you are not setting the draft down too far with the draft control. 2) Make sure your wood is well-seasoned and dry (not open to rain - see Creosote and Fuel sections on ***Pages 5-6***). 3) See Poor Draft section (above) and Cleaning Glass on ***Page 17***.
SMOKES WHEN DOOR IS OPEN:	1) If smoke is entering the room, check to make sure your baffle boards are properly installed and that the baffle blankets are pushed back flush with the front of the baffle boards. 2) Check the chimney for blockage due to creosote (see Chimney and Creosote sections on ***Pages 5 and 7***). 3) Check draft (See POOR DRAFT section above).
WOOD BURNS TOO FAST:	1) The draft control must be closed further. 2) Add fuel at lower firebox temperatures. 3) Load wood side to side and reduce the flow of air under wood. 4) The door seal may need replacing, check for leakage. 5) See "Excessive Draft."
POOR HEAT OUTPUT:	1) Check your wood. Wet, moist, unseasoned wood will not produce heat. 2) Your stove or fireplace insert needs to be seasoned (moisture removed from the steel and brick). Continue to burn a fire. It normally takes from one to three weeks of burning to season your stove (See Burn-In Period on ***Page 6***). 3) See Excessive Draft section above.
PAINT GIVES OFF ODOR (smoke):	Paint is tempering-in. Burn only moderately hot for the first few days until paint is fully cured. Then burn a very hot fire to cure any paint that may not easily cure. Open windows or door to ventilate (See Burn-In Period on ***Page 6***).

DO'S AND DON'TS

DO NOT: Install or operate the appliance before reading this manual.

DO NOT: Close the draft beyond the point at which the flames are completely extinguished.

DO NOT: Open the appliance door without **fully opening** the draft first.

DO NOT: Burn driftwood or wood that has been in salt water. This includes some mill ends and scrap lumber that has been floated in salt water on the way to the mill. (This will void your warranty).

DO NOT: Handle the plated faceplate unnecessarily. Use the door handle only.

DO NOT: Force oversized logs into the firebox as this may dislodge the baffle assembly.

DO NOT: Close the door tightly during Burn-In Period.

DO: Be sure to clean any fingerprints from optional accessories that have plated surfaces before burning the appliance. Clean the plated surfaces only with household type glass cleaner and a very soft cloth.

DO: Consult local building department if other than recommended clearances are desired.

DO: Read instructions for the baffle boards and baffle blankets occasionally to ensure you have not bumped or moved them out of place when loading wood.

DO: Check the chimney and baffle monthly to make sure they are clean.

DO: Burn seasoned, dry wood only! (RAIN = WET WOOD)

DO: Open the door frequently during Burn-In Period to keep gasket from adhering to the curing paint.

DO: Enjoy the warm feeling of your new IHP appliance.

Smoke Detector Recommended

Since there are always several potential sources of fire in any home, we recommend installing smoke detectors. If possible, install the smoke detector in a hallway adjacent to the room (to reduce the possibility of occasional false activation from the heat produced by these appliances). If your local code requires a smoke detector be installed within the same room, you must follow the requirements of your local code. Check with your local building department for requirements in your area.

Carbon Monoxide Monitor Recommended

Carbon Monoxide Poisoning: Early signs of carbon monoxide poisoning are similar to the flu with headaches, dizziness and/or nausea. If you have these signs, obtain fresh air immediately. Some people are more affected by carbon monoxide than others, including pregnant women, people with heart or lung disease or anemia, those under the influence of alcohol, and those at high altitudes.

It is against federal regulations to operate wood heaters in a manner inconsistent with operating instructions in the manual.

PROHIBITED FUELS

This heater is designed to burn natural wood only. Higher efficiencies and lower emissions generally result when burning air dried seasoned hardwoods, as compared to softwoods or to green or freshly cut hardwoods. DO NOT BURN:

- **Garbage;**
- **Lawn clippings or yard waste;**
- **Materials containing rubber, including tires;**
- **Materials containing plastic;**
- **Waste petroleum products, paints or paint thinners, or asphalt products;**
- **Materials containing asbestos;**
- **Construction or demolition debris;**
- **Railroad ties or pressure-treated wood;**
- **Manure or animal remains;**
- **Salt water driftwood or other previously salt water saturated materials;**
- **Unseasoned wood;**
- **Christmas tree branches;**
- **Paper products, colored paper, cardboard, plywood, or particleboard;**
- **gasoline;**
- **naphtha;**
- **engine oil;**
- **flammable liquids;**
- **solvents;**
- **grease; or**
- **coal**

The prohibition against burning these materials does not prohibit the use of fire starters made from paper, cardboard, saw dust, wax and similar substances for the purpose of starting a fire in an affected wood heater.

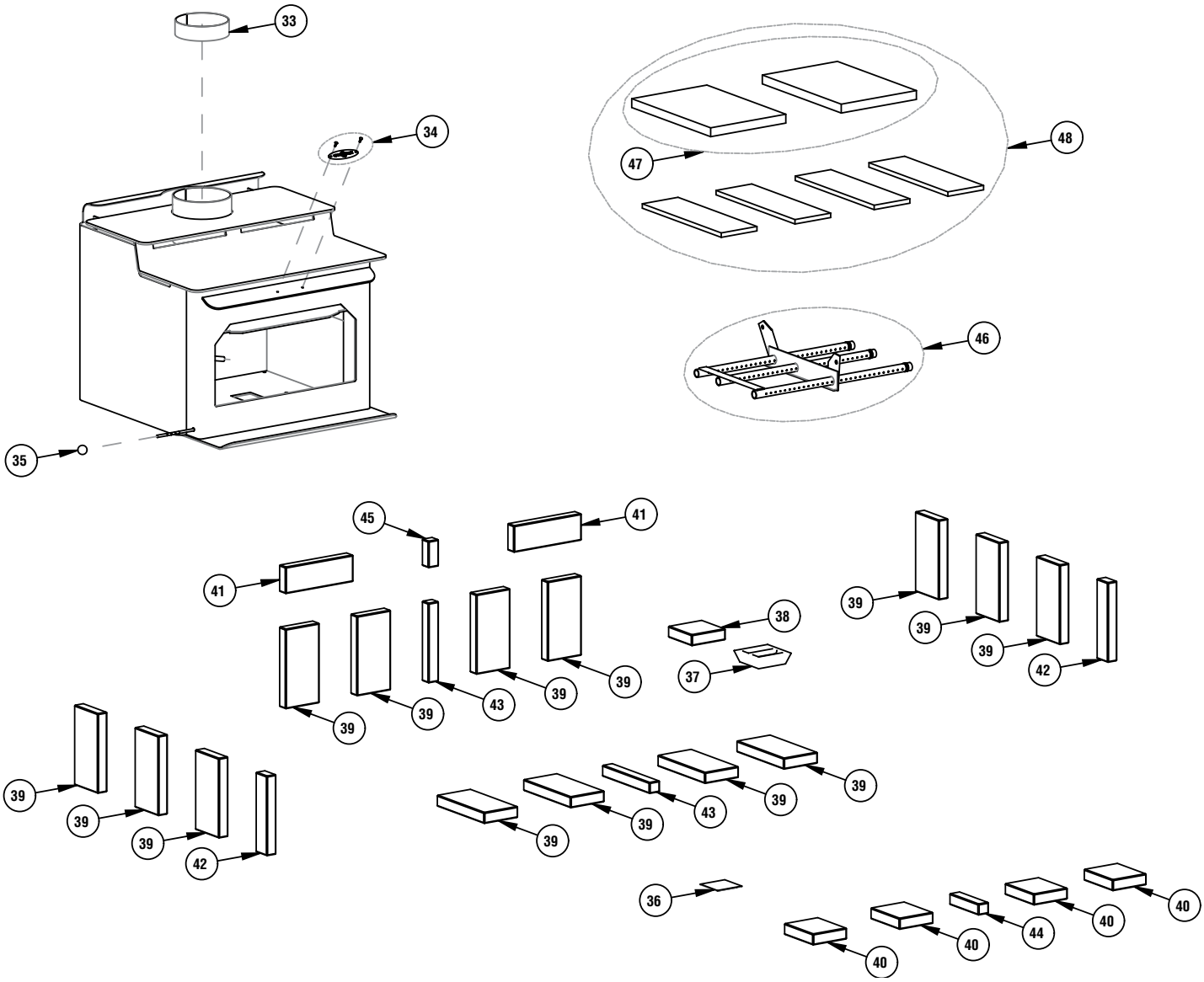
Burning these materials may result in release of toxic fumes or render the heater ineffective and cause smoke. Intense firing with these materials may overheat the fireplace, causing damage to the unit, a fire or even possibly igniting a chimney fire if the chimney is creosoted. Burning unapproved fuel, resulting in excessive pollutants being emitted, may be prohibited and subject to a fine or other penalty by the authority having jurisdiction in your area.

REPLACEMENT PARTS - MODEL S210AGL

Contact an IHP dealer to obtain any of these parts. Never use substitute materials. Use of non-approved parts can result in poor performance and safety hazards.

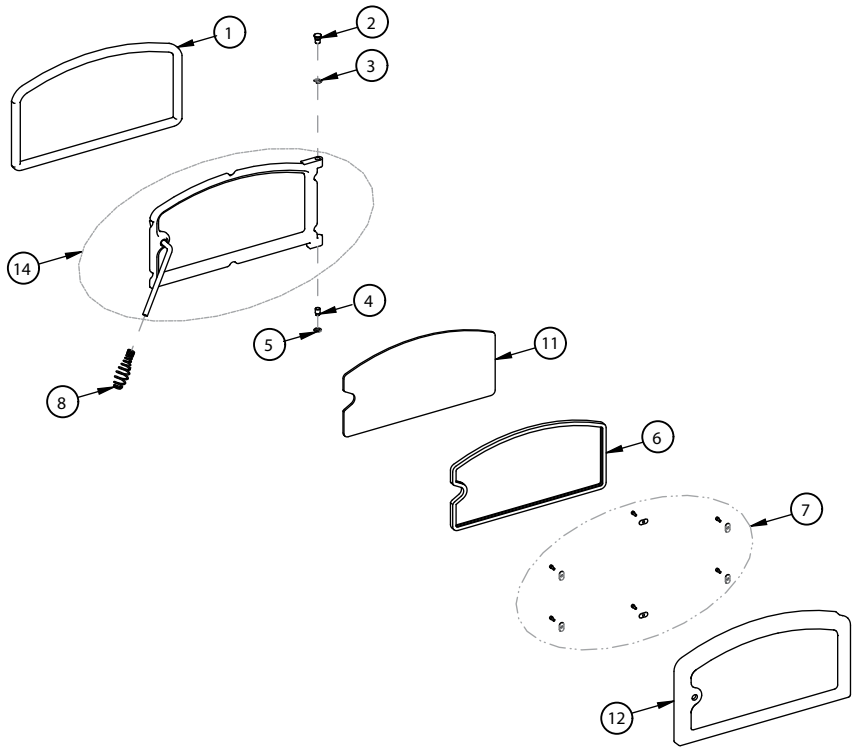
FRONT DOOR PARTS LIST		
Item #	Cat. No	Description
1	H5639	Door Rope Kit, 7/8" Dia. (6' 2")
2	H5629	Upper Hinge Pin
3	H5625	Upper Hinge Pin E-Clip
4	H5628	Lower Hinge Pin
6	H5640	Glass Gasket Kit (8' 4")
7	H5577	Set of 6 screws and 6 washers for door assembly
8	H5654	Spring Handle / Nickel
11	71072	Arch Door Glass / Plain
12	71060	Arch Door Faceplate / Black
	71062	Arch Door Faceplate / Nickel
	71144	Arch Door Faceplate / Brushed Nickel
14	H5578	Arch Door Back w/ Handle (door gasket included)
ASH DRAWER PEDESTAL & PEDESTAL		
15	H5514	Small & Large Pedestal Rear Block Off Plate w/ Hole
16	H5556	Ash Drawer for Large Pedestal
17	H5564	Ash Plug Remover and Rake
18	H5516	Aluminum Flex Tubing Kit w/ clamp (15" of 4" dia.)
19	H5565	6" x 6-1/2" Rodent Screen
LEGS AND LEG PARTS		
18	H5516	Aluminum Flex Tubing Kit w/ clamp (15" of 4" dia.)
20	H5558	Single Black Cascade Leg
21	H5669	Single Black Olympic Leg
	H5621	Single Nickel Olympic Leg
	H5619	Single Brushed Nickel Olympic Leg
22	H5649	Heatshield / Leg Fastener Kit
23	71115	Bottom Heatshield / S210GL
24	H5662	Cascade / Olympic Leg Kit Outside Air Plenum Box
FSB BLOWER PARTS		
25	H8062	FSB700 Blower Only Assembly w/ blower wiring harness
26	H5658	Fan Blade (FSB700)
27	H5657	Fan Cage (FSB700)
28	H8063	FSB700 Blower Only Wire Harness
29	H8064	Snap Switch w/gasket and screws
30	H5742	Speed Control - High Temperature (FSB700)
31	H8065	Control Panel Assembly w/ Snap Switch Housing Assembly
32	H8066	Control Switch (Manual, Off, Automatic)
MISCELLANEOUS PARTS		
	71052	Dry Graphite (Apply to door handle and door hinges)
	H5633	Anti Seize 2 gram pouch
	71134	Stainless Steel Pipe Reducer from 8" to 6"
S210GL STOVE PARTS		
33	H5627	Removable Inner Flue Collar Ring
34	F1871	IronStrike® Nameplate Kit w/ Hardware - Nickel
35	H5650	Draft Rod Knob
36	H8081	Ash Block Off - Hearthplate
37	H5661	Cast Iron Ash Plug
38	H5582	1/2 Cut Brick for Ash Removal
39	H5612	Firebrick 4-1/2" x 9" (14 per stove)
40	H5606	Firebrick 4-1/2" x 5-1/2" (4 per stove)
41	H5605	Firebrick 3" x 9" (2 per stove)
42	H5611	Firebrick 2-1/8" x 9" (2 per stove)
43	H5599	Firebrick 1-1/2" x 9" (2 per stove)
44	H3096	Firebrick 1-1/2" x 5-1/2" (1 per stove)
45	H5603	Firebrick 1-1/2" x 3" (1 per stove)
46	H5571	Complete Baffle/Secondary Burn Tube Assembly (includes tubes and all mounting hardware)
47	H8019	Baffle Blankets 15-1/4" x 12-1/2" x 1" - Two Included
48	H8018	Baffle Board Kit w/ Baffle Blankets

REPLACEMENT PARTS - MODEL S210AGL

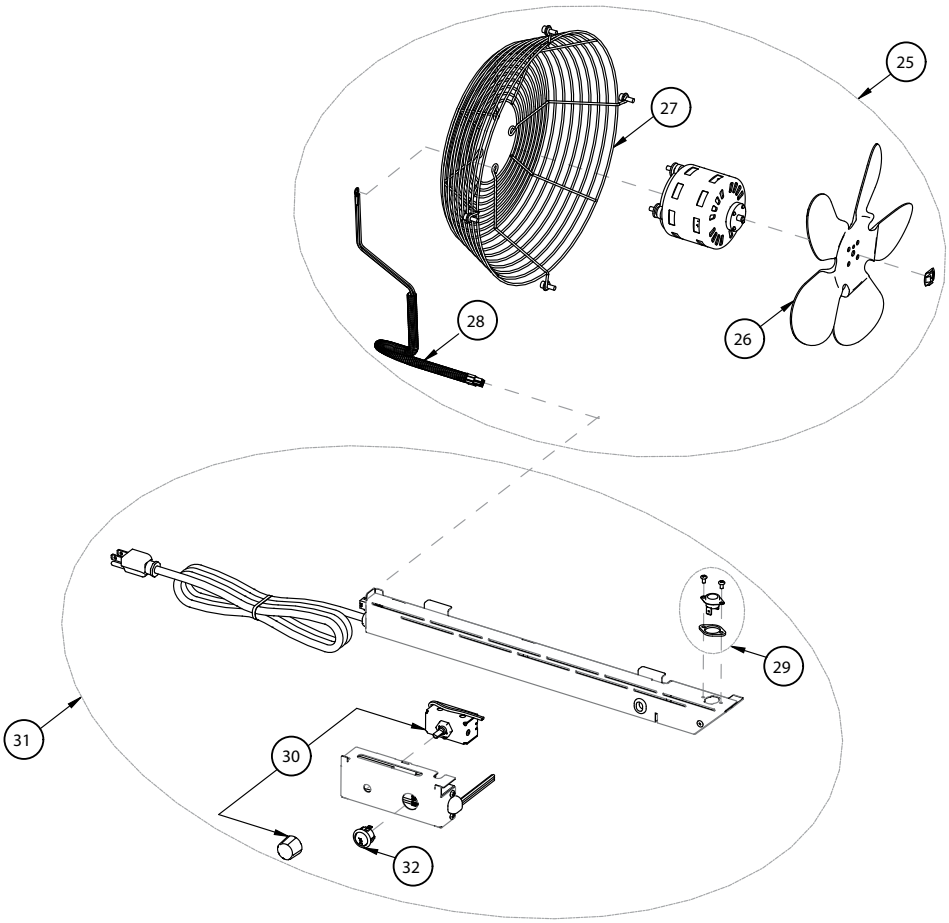


REPLACEMENT PARTS - MODEL S210AGL

Door Parts



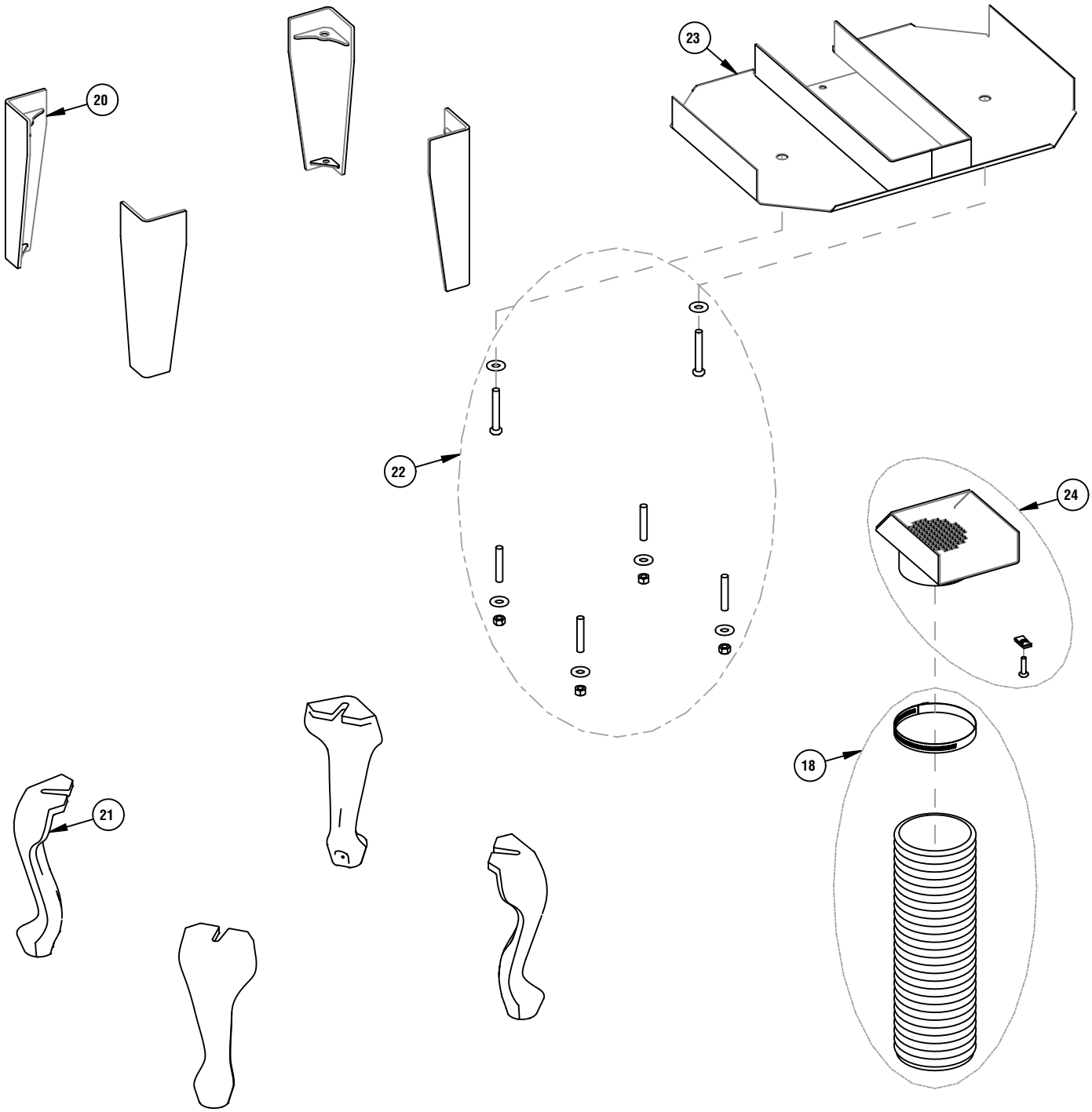
Blower Parts



NOTE: DIAGRAMS & ILLUSTRATIONS ARE NOT TO SCALE.

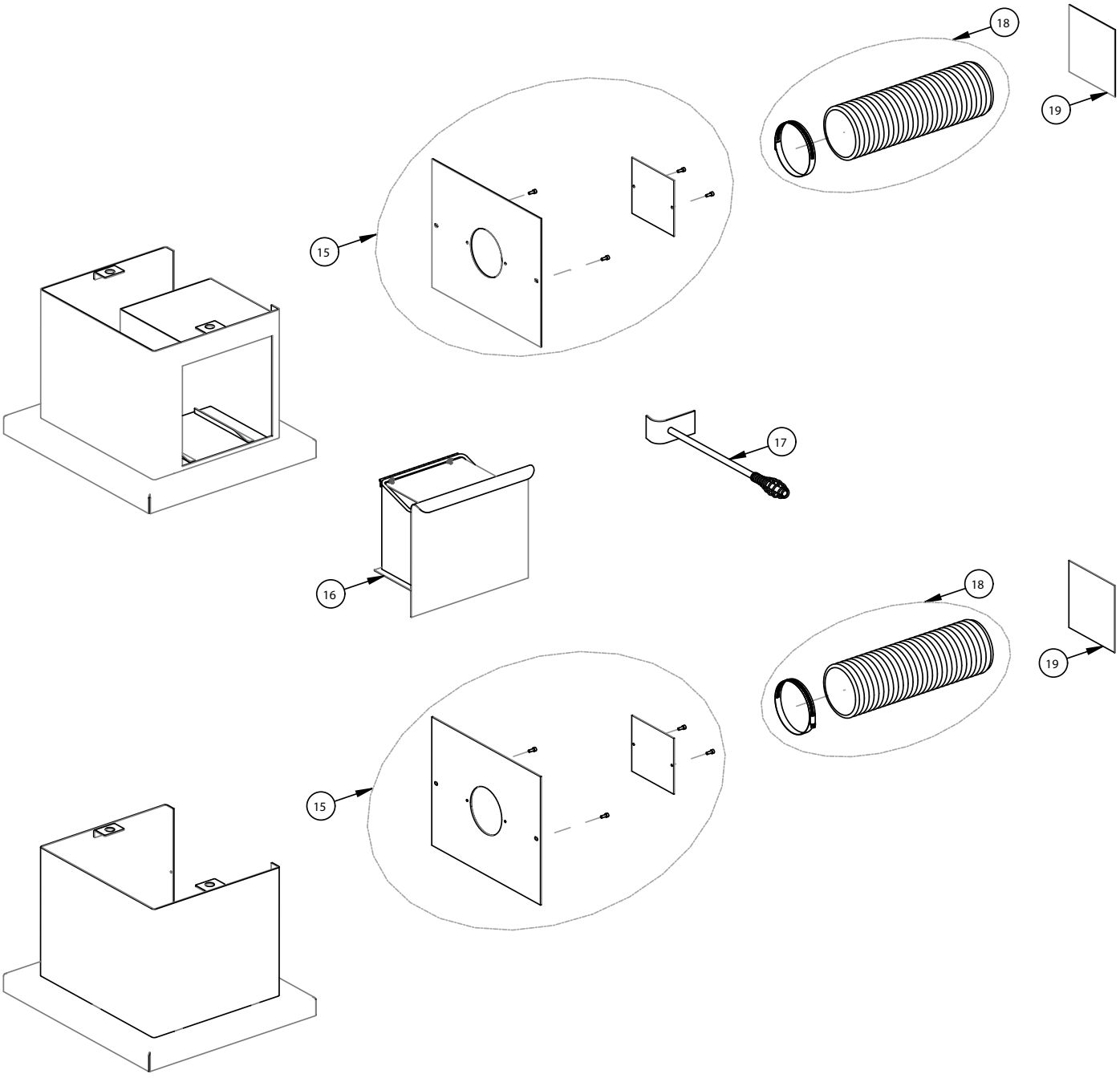
REPLACEMENT PARTS - MODEL S210AGL

Leg and Leg Parts



NOTE: DIAGRAMS & ILLUSTRATIONS ARE NOT TO SCALE.

Ash Drawer Pedestal and Pedestal



NOTE: DIAGRAMS & ILLUSTRATIONS ARE NOT TO SCALE.

ACCESSORIES - MODELS S210AGL

Product Reference Information			
Cat. No.	Description	Ship. Weight	Ship. Volume
TBD	S210AGL, Stove / Step Top / Arch Black Door / Nickel Nameplate	424 lb.	20.74 cu. ft.

PEDESTALS (REQUIRED)		
Cat. No.	Model	Description
71113	WL-PED	Pedestal
71114	WL-PED-ASHD	Ash Drawer Pedestal
OR LEGS (REQUIRED)		
70000	LEG-OLY-B	Olympic Sculptured Black Legs (4 per pkg.)
70002	LEG-OLY-N	Olympic Sculptured Nickel Legs (4 per pkg.)
70008	LEG-OLY-BRN	Olympic Sculptured Brushed Nickel Legs (4 per pkg.)
70003	LEG-CAS-B	Cascade Steel Black Legs (4 per pkg.)
HEAT SHIELD (REQUIRED WITH LEGS)		
71115	WSHS-210	Heat Shield
BLOWER		
H7917	BLWR-FSB700-SS	Blower Kit, FS Woodstoves
OUTSIDE AIR KITS		
71111	OUTAIRK-L	Outside Air Kit / Leg
71112	OUTAIRK-P	Outside Air Kit / Pedestal
MISC.		
H8159	TSPK-B	Touch-Up Paint , Metallic Black, 12 oz. Aerosol
H5308	W-LEGF-LBRKT	Leg Fastening L - Brackets (4 per pkg.) (Tie down kit to be used in mobile or modular homes) *(ref. form #506033-18)*

NOTE: DIAGRAMS & ILLUSTRATIONS ARE NOT TO SCALE.

SAFETY / LISTING LABEL - MODEL S210AGL

CONTACT YOUR LOCAL BUILDING OR FIRE OFFICIALS ABOUT
RESTRICTIONS AND INSTALLATION INSPECTION IN YOUR AREA.
LISTED ROOM HEATERS, SOLID FUEL TYPE ALSO FOR USE IN
MOBILE HOME INSTALLATION (USA ONLY) PURSUANT TO (UM)84-HUD

Report Number 14-185	Model Performer™ S210AGL	Serial No./Numéro de sérle: S210AGL-

IRONSTRIKE® HEAT FOR LIFE

Manufactured By / Fabriqué Par:
INNOVATIVE HEARTH PRODUCTS
1502 14th Street NW
Auburn, WA 98001 USA

PFS C US

"PREVENT HOUSE FIRES"

Install and use only in accordance with manufacturer's installation and operating instructions and your local building codes.

CAUTION: Special methods are required when passing chimney through a wall or ceiling, refer to local building codes. Do not connect this unit to a chimney flue serving another appliance.

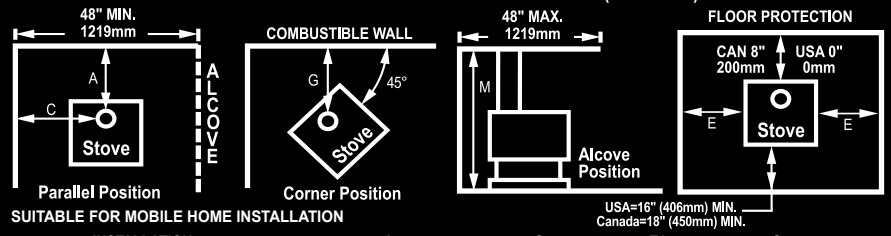
WARNING: (MOBILE HOME USA Only) An outside air inlet must be provided for combustion, and be unrestricted while unit is in use. Do not install appliance in a sleeping room. The structural integrity of the mobile home floor, walls and ceiling/roof must be maintained. Approval void when label is missing.

Model / Modèle: Performer™ S210AGL
Tested to/Testé selon: UL 1482, ULC S627
Type Of Fuel: Solid Wood Only
Optional Blower, Part No. H7917
Blower Electrical Rating: 120V, 60 Hz, 1 Amp
Do not route power cord under or in front of appliance.
WARNING: Do not obstruct the space beneath the heater.
OPERATE ONLY WITH DOOR CLOSED.

This wood heater needs periodic inspection and repair for proper operation. Consult the owner's manual for further information. It is against federal regulations to operate this wood heater in a manner inconsistent with the operating instructions in the owner's manual.

Certification test emission value 1.55 grams/hr per 2020 cordwood standard

Minimum Clearance to Combustible Materials - Inches (millimeters)



SUITABLE FOR MOBILE HOME INSTALLATION

PIPE	INSTALLATION	A	C	E†	G	M
Single Wall	Residential	USA-16" CAN-483mm	USA-24" CAN-635mm	8"/200mm	USA-18" CAN-533mm	84"/2134mm
Single w/Pipe Shield	Residential	USA-10" CAN-330mm	USA-24" CAN-635mm	8"/200mm	USA-18" CAN-533mm	84"/2134mm
Double Wall	Residential or Mobile Home*	USA-10" CAN-330mm	USA-18" CAN-483mm	8"/200mm	USA-15" CAN-450mm	72"/1829mm
Double Wall	Alcove	USA-10" CAN-330mm	USA-21" CAN-559mm	8"/200mm	N/A	72"/1829mm

† USA=8" (200mm) from door opening, Canada=8" (200mm) from sides and back of unit * Mobile Home - USA only

ALCOVE DIMENSIONS (double wall pipe only): Minimum 48" (1219mm) Width, Maximum 48" (1219mm) Depth.

FLOOR PROTECTOR: The hearth and/or floor protection must be a non-combustible hearth/floor protector with a minimum thickness of 3/8" (9.5mm), extending beneath the heater and to the front, sides, and rear as indicated.

NOTICE: All mobile home installations require outside air kits (OAK).

Clearance dimensions are to flue collar. If a single wall connector pipe with shield is used, a 1 inch air space is needed between pipe and shield. Shield attaches to rear of stove pipe and must run from stove top to ceiling. Pipe shield shall be UL listed.

CHIMNEY & CONNECTOR: Minimum 6" diameter, minimum 24 MSG black steel connector pipe with UL103HT listed factory-built chimney suitable for use with solid fuels or masonry chimney. Horizontal connection not tested, refer to local building codes for installation. Clearances to connector shall be measured from 6" flue collar. Restrictions apply! Read instructions before installing.

Mobile Home approved Class A - UL 103HT chimney and double wall connectors:

- Security
- Projet
- Jakes Evans/GSW
- Dura-Vent
- Metal Fab
- Ameri-Tec
- Metalbestos
- Industrial Chimney

RESIDENTIAL chimney systems must be from the same brands as listed for mobile homes but connector pipe may be double wall, single wall, or single wall with shield as listed above.
Connector pipe and chimney must be of the same brand.

COMPONENTS REQUIRED FOR INSTALLATIONS: Legs AND Bottom Heat Shield or Pedestal Base. If optional blower is NOT used, Rear Heat Shield Block Off Plate shall be installed.



CAUTION: HOT WHILE IN OPERATION. DO NOT TOUCH. KEEP CHILDREN, CLOTHING, FURNISHINGS AND COMBUSTIBLE MATERIAL A CONSIDERABLE DISTANCE AWAY. CONTACT MAY CAUSE SKIN BURNS. SEE NAMEPLATE AND INSTRUCTIONS. DO NOT OVERFIRE. IF HEATER OR CHIMNEY CONNECTOR GLOWS, YOU ARE OVERFIRING. INSPECT AND CLEAN CHIMNEY AND CONNECTOR FREQUENTLY. UNDER CERTAIN CONDITIONS OF USE, CREOSOTE BUILDUP MAY OCCUR RAPIDLY. DO NOT USE GRATE OR ELEVATE FIRE - BUILD WOOD FIRE DIRECTLY ON HEARTH. FEED DOOR MUST BE CLOSED DURING FIRING EXCEPT WHEN ADDING FUEL. KEEP ASH DOOR CLOSED TO AVOID EXCESS HEAT. DANGER: RISK OF ELECTRICAL SHOCK. DISCONNECT POWER BEFORE SERVICING UNIT. TYPE OF FUEL: SOLID WOOD ONLY.

Date of Manufacture / Date De Fabrication

2019	2020	2021	JAN JANV	FEB FEVR	MAR MARS	APR AVR	MAY MAI	JUN JUIN	JUL JUIL	AUG AOÛT	SEP SEPT	OCT OCT	NOV NOV	DEC DEC
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U.S. ENVIRONMENTAL PROTECTION AGENCY
Certified to comply with 2020 cordwood standard.

Part No. 900981-03 Rev. 0, 04/2019 DO NOT REMOVE THIS LABEL Made in U.S.A.

Innovative Hearth Products
IronStrike® Brand Wood Burning Stove and Insert
Limited Lifetime Warranty

THE WARRANTY

Innovative Hearth Products ("IHP") Limited Lifetime Warranty warrants your IronStrike® Brand Wood Burning Stove or Insert ("Product") to be free from defects in materials and workmanship at the time of manufacture. The Product body, firebox and ceramic glass carry the Limited Lifetime Warranty. Ceramic glass carries the Limited Lifetime Warranty against thermal breakage only. After installation, if covered components manufactured by IHP are found to be defective in materials or workmanship during the Limited Lifetime Warranty period and while the Product remains at the site of the original installation, IHP will, at its option, repair or replace the covered components. If repair or replacement is not commercially practical, IHP will, at its option, refund the purchase price or wholesale price of the IHP product, whichever is applicable. IHP will also pay IHP prevailing labor rates, as determined in its sole discretion, incurred in repairing or replacing such components for up to five years. THERE ARE EXCLUSIONS AND LIMITATIONS to this Limited Lifetime Warranty as described herein.

COVERAGE COMMENCEMENT DATE

Warranty coverage begins on the date of purchase. In the case of new home construction, warranty coverage begins on the date of first occupancy of the dwelling or six months after the sale of the Product by an independent IHP dealer/distributor, whichever occurs earlier. The warranty shall commence no later than 24 months following the date of product shipment from IHP, regardless of the installation or occupancy date.

EXCLUSIONS AND LIMITATIONS

This Limited Lifetime Warranty applies only if the Product is installed in the United States or Canada and only if operated and maintained in accordance with the printed instructions accompanying the Product and in compliance with all applicable installation and building codes and good trade practices.

This warranty is non-transferable and extends to the original owner only. The Product must be purchased through a listed supplier of IHP and proof of purchase must be provided. The Product body and firebox carry the Limited Lifetime Warranty from the date of installation. Vent components, trim components and paint are excluded from this Limited Lifetime Warranty. The following do not carry a Limited Lifetime Warranty but are warranted as follows:

Cast Iron Heat Exchanger – Replacement for five years from the date of installation
Cast iron parts – Replacement for one year from the date of installation
Catalyst – Carries a separate warranty. Refer to the warranty certificate provided for that part
Electrical components – Repair or replacement for one year from date of installation
Gaskets – Replacement for one year from the date of installation.
Gold & nickel plating – Replacement for two years from date of installation. Excludes tarnishing
Refractory & screens – Replacement for two years from date of installation. Excludes hairline cracks
Removable air tubes – Repair or replacement for seven years from date of installation. IHP prevailing labor rates for years one through five.
Labor coverage – Prevailing IHP labor rates apply for the warranty period of the component, unless otherwise noted

Parts not otherwise listed carry a 90 day warranty from the date of installation.

Whenever practicable, IHP will provide replacement parts, if available, for a period of 10 years from the last date of manufacture of the Product.

IHP will not be responsible for: (a) damages caused by normal wear and tear, accident, riot, fire, flood or acts of God; (b) damages caused by abuse, negligence, misuse, or unauthorized alteration or repair of the Product affecting its stability or performance. (The Product must be subject to normal use with approved fuels listed in the Operation Manual provided with the product. Fuel products with abnormal burning characteristics, including but not limited to fuel such as driftwood, coal or plywood and wood products using a binder may burn at excessive temperatures and may cause damage to the Product or may cause it to function improperly; IHP stoves, inserts and high efficiency EPA fireplaces are approved for burning dry seasoned wood only.); (c) damages caused by failing to provide proper maintenance and service in accordance with the instructions provided with the Product; (d) damages, repairs or inefficiency resulting from faulty installation or application of the Product.

Coverage of this Limited Lifetime Warranty is conditional upon the appliance being operated without the use of grates, irons or any other method to elevate the fire.

IHP is not responsible for inadequate system draft caused by air conditioning and heating systems, mechanical ventilation systems, or general construction conditions which may generate negative air pressure in the room in which the appliance is installed. Additionally IHP assumes no responsibility for smoking conditions caused by inadequate chimney height, adjoining trees or buildings, adverse wind conditions or unusual environmental factors and conditions. Certain IHP Products are listed for use with Security Chimneys International, Ltd. chimney systems only. Use of chimney components other than that specified in the Product manual will void the Product warranty.

This Limited Lifetime Warranty covers only parts and labor as provided herein. In no case shall IHP be responsible for materials, components or construction which are not manufactured or supplied by IHP or for the labor necessary to install, repair or remove such materials, components or construction. Additional utility bills incurred due to any malfunction or defect in equipment are not covered by this Limited Lifetime Warranty. All replacement or repair components will be shipped F.O.B. from the nearest stocking IHP factory.

LIMITATION ON LIABILITY

It is expressly agreed and understood that IHP's sole obligation and the purchaser's exclusive remedy under this warranty, under any other warranty, expressed or implied, or in contract, tort or otherwise, shall be limited to replacement, repair, or refund, as specified herein.

In no event shall IHP be liable for any incidental or consequential damages caused by defects in the Product, whether such damage occurs or is discovered before or after replacement or repair, and whether such damage is caused by IHP's negligence. IHP has not made and does not make any representation or warranty of fitness for a particular use or purpose, and there is no implied condition of fitness for a particular use or purpose.

IHP makes no expressed warranties except as stated in this Limited Lifetime Warranty. The duration of any implied warranty is limited to the duration of this expressed warranty.

No one is authorized to change this Limited Lifetime Warranty or to create for IHP any other obligation or liability in connection with the Product. Some states and provinces do not allow the exclusion or limitation of incidental or consequential damages, so the above limitations or exclusions may not apply to you. The provisions of this Limited Lifetime Warranty are in addition to and not a modification of or subtraction from any statutory warranties and other rights and remedies provided by law.

INVESTIGATION OF CLAIMS AGAINST WARRANTY

IHP reserves the right to investigate any and all claims against this Limited Lifetime Warranty and to decide, in its sole discretion, upon the method of settlement.

To receive the benefits and advantages described in this Limited Lifetime Warranty, the appliance must be installed and repaired by a licensed contractor approved by IHP.

Contact IHP at the address provided herein to obtain a listing of approved dealers/distributors. **IHP shall in no event be responsible for any warranty work done by a contractor that is not approved without first obtaining IHP's prior written consent.**

HOW TO REGISTER A CLAIM AGAINST WARRANTY

In order for any claim under this warranty to be valid, you must contact the IHP dealer/distributor from which you purchased the product. If you cannot locate the dealer/distributor, then you must notify IHP in writing. IHP must be notified of the claimed defect in writing within 90 days of the date of failure. Notices should be directed to the IHP Warranty Department at 1769 East Lawrence Street; Russellville, AL 35654 or visit our website at WWW.IRONSTRIKE.US.COM.

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P/N 900205-00, Rev. B 02/2018

Innovative Hearth Products
1769 East Lawrence Street • Russellville, AL 35654

WARRANTY

Your wood appliance is covered by a limited warranty (provided with the appliance). Please read the warranty to be familiar with its coverage.

Retain this manual. File it with your other documents for future reference.

REPLACEMENT PARTS

See ***Pages 24 through 28*** for a complete replacement parts list. Use only parts supplied from the manufacturer.

Normally, all parts should be ordered through your IHP distributor or dealer. Parts will be shipped at prevailing prices at time of order.

When ordering repair parts, always give the following information:

1. The model number of the appliance.
2. The Serial Number of the appliance.
3. The part number.
4. The description of the part.
5. The quantity required.
6. The installation date of the appliance.

If you encounter any problems or have any questions concerning the installation or application of this system, please contact your dealer.

Innovative Hearth Products (IHP)
1769 East Lawrence Street
Russellville, AL 35654
IronStrike.us.com

PRODUCT REFERENCE INFORMATION

We recommend that you record the following important information about your appliance. If you did not purchase your appliance directly from an IHP dealer, then contact us at IronStrike.us.com to find your nearest IHP dealer who will answer your questions or address your concerns.

Model Number _____

Serial Number _____

Date Installed _____

Your Dealer's Name _____

NATIONAL FIREPLACE INSTITUTE NFI CERTIFIED www.nficertified.org

We recommend that our woodburning hearth products be installed and serviced by professionals who are certified in the U.S. by the National Fireplace Institute® (NFI) as NFI Woodburning Specialists or who are certified in Canada by Wood Energy Technical Training (WETT).

Wood Energy Technical Training www.wettinc.ca

Innovative Hearth Products (IHP) reserves the right to make changes at any time, without notice, in design, materials, specifications, and prices, and also to discontinue colors, styles, and products. Consult your local distributor for fireplace code information.

INNOVATIVE HEARTH PRODUCTS

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P900981-00

CONTACT LOCAL BUILDING OR FIRE OFFICIALS ABOUT RESTRICTIONS AND INSTALLATION INSPECTION IN YOUR AREA. ROOM HEATER, SOLID FUEL TYPE, ALSO FOR USE IN MOBILE HOMES PURSUANT TO (UM) 84-HUD.
COMMUNIQUEZ AVEC LES AUTORITÉS LOCALES EN BÂTIMENT OU LE SERVICE DE PRÉVENTION DES INCENDIES POUR CONNAÎTRE LES NORMES D'INSTALLATION ET D'INSPECTION DE VOTRE RÉGION. APPAREIL DE CHAUFFAGE CERTIFIÉ POUR COMBUSTIBLE SOLIDE PEUT-ÊTRE INSTALLÉ DANS UNE MAISON MOBILE SELON (UM) 84-HUD

IRONSTRIKE® HEAT FOR LIFE

Report No./Numéro de Rapport	Model / Modèle	Serial No./Numéro de sérle:
14-193	Tahoma™ 2100GL	T2100GL-

Manufactured By / Fabriqué Par:
Innovative Hearth Products
1502 14th St NW
Auburn, WA 98001 USA

Tested to: UL 1482, ULC S627
Type Of Fuel: Solid Wood Only
Optional Blower, Part No. H8873, Model BLWR-ES-S-150
Blower Electrical Rating: 120V, 60 Hz, 1 Amp
Do not route power cord under or in front of appliance.
Replace glass only with 5mm ceramic.
Operate only with doors closed.
Do not obstruct the space beneath the heater.
This wood heater needs periodic inspection and repair for proper operation. Consult the owner's manual for further information. It is against federal regulations to operate this wood heater in a manner inconsistent with the operating instructions in the owner's manual.
Certification test emission value 1.55 grams/hr per 2020 cordwood standard

Tested to/Testé selon: UL 1482, ULC S627
Type de combustible: Bois seulement
Ventilateur Optionnel, No. De Pièces: H8873, Modèle BLWR-ES-S-150
Spécification Électrique Du Ventilateur: 120V, 60 Hz, 1 Amp
Ne pas faire passer le fil électrique sous ou en avant de l'appareil
Remplacez la vitre seulement avec la céramique de 5 millimètres.
Faire functionner uniquement lorsque les portes sont fermées.
Ne pas obstruer l'espace sous la bouche de chaleur.
Cet appareil de chauffage au bois doit être inspecté et entretenu périodiquement pour fonctionner correctement. Voir le manuel du propriétaire pour plus d'information. L'utilisation de cet appareil de chauffage au bois de manière incompatible avec les instructions du manuel du propriétaire constitue une infraction aux régulations fédérales.
Valeur d'émission du test d'homologation 1,55 g/h selon la norme 2020

"PREVENT HOUSE FIRES"

Install and use only in accordance with manufacturer's installation and operating instructions and your local building codes.

CAUTION: Special methods are required when passing chimney through a wall or ceiling, refer to installation instructions and local building codes. Do not connect this unit to a chimney flue serving another appliance.

CAUTION: Moving Parts May Cause Injury. Do Not Operate Unit With Blower Cover Removed.

WARNING: Burning improper fuel (e.g. charcoal) can result in carbon monoxide poisoning, which may lead to death!

WARNING: (MOBILE HOME USA Only) An outside air inlet must be provided for combustion, and be unrestricted while unit is in use. Do not install appliance in a sleeping room. The structural integrity of the mobile home floor, walls and ceiling/roof must be maintained. Approval void when label is missing.

"PREVENTION DES INCENDIES"

Installer et utiliser l'appareil en conformité avec les directives d'installation du fabricant et des autorités locales en bâtiment ou le service de prévention des incendies.

ATTENTION : Prenez des précautions spéciales lorsque vous faites passer une cheminée à travers un mur ou un plafond, référez-vous aux instructions d'installation et aux codes locaux de la construction. Ne pas brancher cette unité à un conduit de fumée raccordé à un autre appareil.

ATTENTION : Des pièces en mouvement peuvent causer des blessures. Ne pas opérer le ventilateur avec son protecteur retiré.

AVERTISSEMENT : La combustion d'un combustible inadapté (charbon) peut provoquer une intoxication au monoxyde de carbone et entraîner la mort !

AVERTISSEMENT : (MAISON MOBILE USA seulement) Une entrée d'air extérieure doit être installée et libre de toute restriction lors de l'utilisation de l'appareil. Ne pas installer l'appareil dans une chambre à coucher. L'intégrité structurale du plancher, des murs et du plafond/toit de la maison mobile doivent être maintenus.

CHIMNEY & CONNECTOR: Minimum 6" diameter, minimum 24 MSG black steel connector pipe with UL103HT listed factory-built chimney suitable for use with solid fuels or masonry chimney. Horizontal connection not tested, refer to local building codes for installation. Clearances to connector shall be measured from 6" flue collar. Restrictions apply! Read instructions before installing.

Mobile Home approved Class A - UL 103HT chimney and double wall connectors:
- Security
- Jakes Evans/GSW
- Dura-Vent
- Metal Fab
- Ameri-Tec
- Metalbestos
- IndustrialChimney

RESIDENTIAL chimney systems must be from the same brands as listed for mobile homes but connector pipe may be double wall or single wall.

Connector pipe and chimney must be of the same brand.

If optional blower is NOT used, Rear Heat Shield Block Off Plate shall be in place.

CHEMINÉE ET TUYAU CONNECTEUR : Approuvé pour raccordement avec un conduit de raccordement en acier noir 24 jauges minimum de 6" de diamètre et une cheminée préfabriquée certifiée pour combustible solide ou une cheminée de maçonnerie. Non certifié pour installation horizontale, référez-vous aux autorités locales en bâtiment. Des restrictions s'appliquent! Lisez les directives avant d'effectuer l'installation.

MAISON MOBILE (USA SEULEMENT) : cheminée certifiée Classe A – UL103HT et tuyaux connecteurs doubles parois :
- Security
- Jakes Evans/GSW
- Dura-Vent
- Metal Fab
- Ameri-Tec
- Metalbestos
- Industrial Chimney

RÉSIDENTIEL: Cheminée de la même marque de commerce que pour les maisons mobiles ci-dessus, mais le tuyau connecteur peut-être à double ou simple parois.

Le tuyau connecteur et la cheminée doivent être de la même marque de commerce.

Si l'option du ventilateur n'est pas utilisé, la plaque arrière coupe radiation doit être en place.

Made in U.S.A.
Fabriqué aux U.S.A.

DO NOT REMOVE THIS LABEL
NE PAS ENLEVER OU RECOUVRIR CETTE ÉTIQUETTE

Date of Manufacture / Date De Fabrication

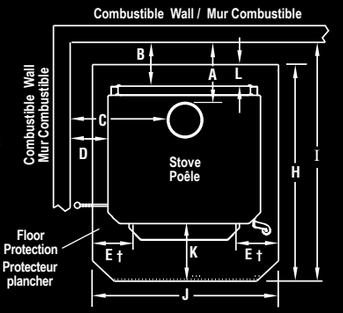
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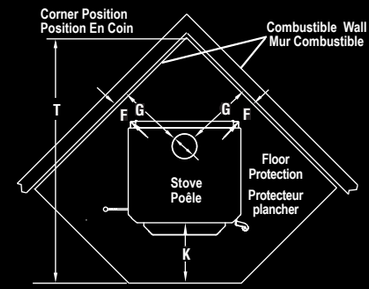
U.S. ENVIRONMENTAL PROTECTION AGENCY
Certified to comply with 2020 cordwood standard.

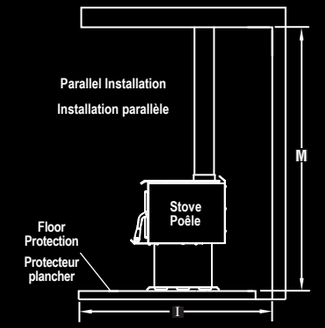
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Minimum Clearance to Combustible Materials

Dégagements Minimums Aux Matériaux Combustibles







	PIPE	INSTALLATION	A	B	C	D	E	F	G	H	I	J	K	L	M	T
USA inches (millimeters)	Single Wall / Simple Paroi	Residential / Résidentielle	14-1/4 (362)	11-1/2 (292)	23 (584)	13-3/8 (340)	8 (200)	9 (229)	18 (457)	37-5/8 (956)	49 (1245)	34-7/8 (886)	16 (406)	0 (0)	84 (2134)	61-1/2 (1562)
	Double Wall / Double Parois	Residential or Mobile Home / Résidentielle ou maisons mobiles	12 (305)	9-1/8 (232)	19-1/2 (495)	9-5/8 (245)	8 (200)	6 (152)	15 (381)	37-5/8 (956)	46-3/4 (1188)	34-7/8 (886)	16 (406)	0 (0)	84 (2134)	57-1/2 (1461)
Canada pounces (millimètres)	PIPE	INSTALLATION	A	B	C	D	E	F	G	H	I	J	K	L	M	T
	Single Wall / Simple Paroi	Residential / Résidentielle	14-1/4 (362)	11-1/2 (292)	23 (584)	13-3/8 (340)	8 (200)	9 (229)	18 (457)	47-5/8 (1210)	51 (1295)	40-7/8 (1038)	18 (450)	8 (200)	84 (2134)	63-1/2 (1613)
	Double Wall / Double Parois	Residential or Mobile Home / Résidentielle ou maisons mobiles	12 (305)	9-1/8 (232)	19-1/2 (495)	9-5/8 (245)	8 (200)	6 (152)	15 (381)	47-5/8 (1210)	48-3/4 (1238)	40-7/8 (1038)	18 (450)	8 (200)	84 (2134)	59-1/2 (1511)

† USA=8" (200mm) from door opening, Canada=8" (200mm) from sides and back of unit

FLOOR PROTECTOR: The hearth and/or floor protection must be a non-combustible hearth/floor protector with a minimum thickness of 3/8" (9.5mm), extending beneath the heater and to the front, sides, and rear as indicated.

SUITABLE FOR MOBILE-HOME INSTALLATION.

NOTICE: All mobile home installations require outside air kits (H8874).

Clearance dimensions are to flue collar.

† USA= 8" (200mm) à l'avant de la porte, Canada 8" de chaque côté de l'appareil.

PANNEAU PROTECTEUR PLANCHER : Les panneaux protecteurs doivent être non combustible, dont l'épaisseur minimale est de 3/8" (9.5mm) et doivent s'étendre sous l'appareil, à l'avant des portes, à l'arrière et de chaque côté tel qu'indiqué.

CONÇU POUR MAISONS MOBILES.

AVIS: USA SEULEMENT - Toutes les installations dans une maison mobile requièrent un ensemble de prise d'air extérieur (H8874).

Les distances de dégagement sont pour un conduit de 6".

CAUTION

HOT WHILE IN OPERATION. DO NOT TOUCH, KEEP CHILDREN, CLOTHING AND FURNITURE AWAY. CONTACT MAY CAUSE SKIN BURNS. SEE NAMEPLATE AND INSTRUCTIONS. DO NOT OVERFIRE. IF HEATER OR CHIMNEY CONNECTOR GLOWS, YOU ARE OVERFIRING. INSPECT AND CLEAN CHIMNEY AND CONNECTOR FREQUENTLY. UNDER CERTAIN CONDITIONS OF USE, CREOSOTE BUILDUP MAY OCCUR RAPIDLY. DO NOT USE GRATE OR ELEVATE FIRE - BUILD WOOD FIRE DIRECTLY ON HEARTH. FEED DOOR MUST BE CLOSED DURING FIRING EXCEPT WHEN ADDING FUEL. KEEP ASH DOOR CLOSED TO AVOID EXCESS HEAT. DANGER: RISK OF ELECTRICAL SHOCK. DISCONNECT POWER BEFORE SERVICING UNIT. FOR USE WITH SOLID WOOD FUEL ONLY.

ATTENTION

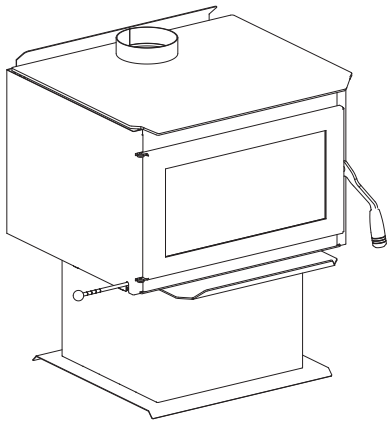
L'APPAREIL EST CHAUD LORS DE L'OPÉRATION. NE PAS Y TOUCHER. RISQUE DE BRÛLURES CUTANÉES. TENIR LES ENFANTS, LES MATÉRIAUX COMBUSTIBLES, LES VÊTEMENTS ET LES MEUBLES ELOIGNÉS DE L'APPAREIL. VOIR LA PLAQUE SIGNALÉTIQUE ET LES DIRECTIVES. NE PAS SURCHAUFFER L'APPAREIL. SI L'APPAREIL OU LE TUYAU DE CHEMINÉE ROUGIT, VOUS SURCHAUFFEZ. INSPECTER ET NETTOYER LA CHEMINÉE ET LE TUYAU CONNECTEUR FRÉQUEMMENT. SOUS CERTAINES CONDITIONS, IL SE PEUT QUE LE CRÉOSOTE S'ACCUMULE RAPIDEMENT. NE SURÉLEVER PAS LE FEU À L'AIDE D'UN CHENET. DÉPOSER LES BÛCHES DE BOIS DIRECTEMENT SUR L'ÂTRE. LA PORTE DOIT ÊTRE FERMÉE PENDANT L'USAGE SAUF POUR ALIMENTER LE FEU. GARDER LA PORTE "BY-PASS" (CENDRES) FERMÉE POUR ÉVITER DE SURCHAUFFER. DANGER: RISQUES DE DÉCHARGE ÉLECTRIQUE. DÉCONNECTER LE FIL ÉLECTRIQUE DE LA PRISE DE CONTACT AVANT LE SERVICE. NE PAS FAIRE PASSER LE FIL ÉLECTRIQUE SOUS OU EN AVANT DE L'APPAREIL. POUR USAGE AVEC LE BOIS SEULEMENT.

IRONSTRIKE®
HEAT FOR LIFE

INSTALLATION AND OPERATION MANUAL

Free-Standing
EPA Certified
Wood-Burning Stoves

Save These Instructions
For Future Reference



P/N 900978-00, Rev. NC, 05/2019

P900978-00

Wood-Burning Stove
Model Tahoma™ 2100GL

PFS® C US

Report # 14-193

NATIONAL FIREPLACE INSTITUTE NFI CERTIFIED
www.nficertified.org

We recommend that our woodburning hearth products be installed and serviced by professionals who are certified in the U.S. by the National Fireplace Institute® (NFI) as NFI Woodburning Specialists or who are certified in Canada by Wood Energy Technical Training (WETT).

Wood Energy Technical Training www.wettinc.ca

A French manual is available upon request. Order P/N 900978-01.

Ce manuel d'installation est disponible en francais, simplement en faire la demande. Numéro de la pièce 900978-01.

This appliance must be properly installed and operated in order to prevent the possibility of a house fire. Please read this entire installation and operation manual before installing and using your wood stove. Failure to follow these instructions could result in property damage, bodily injury or even death. Contact your local building or fire officials to obtain a permit and information on any installation requirements and inspection requirements in your area.

⚠ WARNING

- **Hot! Do not touch! The glass and surfaces of this appliance will be hot during operation and will retain heat for a while after shutting off the appliance. Severe burns may result.**
- **Carefully supervise children in the same room as appliance.**

Agency Copy

CONGRATULATIONS!

When you purchased your new wood stove, you joined the ranks of thousands of individuals whose answer to their home heating needs reflects their concern for aesthetics, efficiency and our environment. We extend our continued support to help you achieve the maximum benefit and enjoyment available from your new wood stove.

Thank you for selecting an Innovative Hearth Products (IHP) Stove as the answer to your home supplemental heating needs.

TABLE OF CONTENTS

Using This Manual 2
Important Safety Information 3
Testing Information 4
Draft Requirements 4
Selecting the Proper Venting System 4
Negative Pressure Warning 5
Clearances to Combustibles 6-7
Floor Protection 6
Chimney and Connector 6
Components 6
Installation Clearances 7
Specifications 8
Typical Installation Figures 9
Chimney Installation 10
Manufactured (mobile) Home Installations 10
Chimney - Wall Pass-Through Requirements 11
Outside Combustion Air Kit Installation 12
Brick Installation 13
Post Installation Checks 14
Paint Curing 15
Burn-In Period 15
Operating Hints 15
Door Operation 15
Starting and Maintaining a Fire 16
Fuel 17
Getting the Most Out of Your Stove 18
Maximizing Your Stove's Overall Efficiency 18
Achieving Clean, Long Burns 18
Optional Blower Kit 19
Do's and Don'ts 20
Smoke Detector Recommended 20
Carbon Monoxide Monitor Recommended 20
Maintenance 21
Creosote 22
Troubleshooting 23
Replacement Parts Lists 24
Accessories 25
Safety / Listing Label 26
Warranty 27
Product Reference Information 28

USING THIS MANUAL

Please read and carefully follow all of the instructions found in this manual. Please pay special attention to the safety instructions provided in this manual.

PRODUCT IS SUBJECT TO CHANGE WITHOUT NOTICE

IMPORTANT SAFETY AND WARNING INFORMATION

READ THIS MANUAL IN ITS ENTIRETY AND UNDERSTAND THESE RULES TO FOLLOW FOR SAFETY.

1. When this room heater is not properly installed, a house fire may result. To reduce the risk of fire, follow the installation instructions. Contact local building or fire officials about restrictions and installation inspection requirements in your area.
2. Wear gloves during installation to avoid injury from sharp edges on the stove and/or its parts.
3. This unit is designed and engineered to burn only dry, well-seasoned wood. Burning wet wood will greatly reduce the stove's efficiency, produce excessive amounts of smoke and can cause dangerous chimney fires due to creosote build-up.
4. Before opening the door, the draft control must be fully open to avoid possible combustion flash (ignition of hot volatile gases as the door is opened).
5. Never use gasoline, gasoline-type lantern fuel, kerosene, charcoal lighter fluid, or similar liquids to start or 'freshenup' a fire in this heater. Keep all such liquids well away from the heater while it is in use. DO NOT USE CHEMICALS OR FLUIDS TO START THE FIRE.
6. While burning, fuel utilizes oxygen from the air in the room. Be sure to allow an adequate amount of fresh air into the room where the stove is burning.
7. The outside surface of the stove will be hot while burning properly and can set items like clothing and curtains on fire. Keep furnishings and other combustible materials away from the stove. Using the heat from the stove to dry wet clothing can be hazardous if clothes are placed too near the surface of the stove.
8. HOT WHILE IN OPERATION. KEEP CHILDREN, CLOTHING FURNISHINGS AND COMBUSTIBLE MATERIAL A CONSIDERABLE DISTANCE AWAY. CONTACT MAY CAUSE SKIN BURNS. Do not allow children to play near the stove without close supervision. Do not touch the stove while it is burning. Use extreme caution while the unit is in use. Surface temperatures become dangerously hot and can cause serious burns.
9. Do not allow anyone to operate the stove who is not familiar with the operating instructions.
10. Attempts to achieve heat output rates that exceed stove design specifications can result in permanent damage to the stove. Never leave your stove unattended on high burn rates. This may cause overfiring. Overfiring the stove may cause a house fire. If the stove glows, you are overfiring.
11. Keep a water hose or hand-operated fire extinguisher close for safety.
12. Smoke Detectors - Since there are always several potential sources of fire in any home, we recommend installing smoke detectors. If possible, install the smoke detector in a hallway adjacent to the room (to reduce the possibility of occasional false activation from the heat produced by the stove). If your local code requires a smoke detector be installed within the same room, you must follow the requirements of your local code. Check with your local building department for requirements in your area.
13. Inspect your chimney at least once a month during the burning season to check for soot and creosote accumulations. Any accumulations over 1/8" thick should be removed by a professional chimney sweep. Do not attempt to burn out heavy creosote accumulations with a hot fire. If large accumulations are occurring, review your burning procedures.
14. If a creosote fire should develop, the fire department should be called immediately and then attempts should be made to control the fire until assistance arrives. If a "runaway" fire should develop causing over-heating of the stove, the door and draft regulators should be closed immediately. The fire should die down once deprived of oxygen. After a severe chimney fire, the complete chimney system should be checked before further use.
15. Do Not Use Grate Or Elevate Fire - Build Wood Fire Directly On Hearth (firebrick). Do not use andirons or other methods of supporting the fuel.
16. Please read this entire manual before you install and use your new room heater. Failure to follow instructions may result in property damage, bodily injury, or even death.
17. Check all local building and safety codes before installation. The installation instructions and appropriate code requirements must be followed exactly and without compromise. In the absence of local codes the following standards and codes must be followed.
18. In the U.S.A, install in accordance with the National Fire Protection Association's Code, NFPA 211, Standards for Chimneys, Fireplaces, Vents and Solid-Fuel-Burning Appliances, or similar regulations, may apply to the installation of a Solid-Fuel-Burning appliance in your area. In Canada, the guideline is established by the CSA Standard, CAN/CSA-B365-M93, Installation Code for Solid-Fuel-Burning Appliances and Equipment.
19. DO NOT CONNECT TO OR USE IN CONJUNCTION WITH ANY AIR DISTRIBUTION DUCTWORK UNLESS SPECIFICALLY APPROVED FOR SUCH INSTALLATIONS.
20. WARNING: BURNING IMPROPER FUEL (I.E. CHARCOAL) CAN RESULT IN CARBON MONOXIDE POISONING, WHICH MAY LEAD TO DEATH!
21. Carbon Monoxide Poisoning – Early signs of carbon monoxide poisoning resemble the flu with headaches, dizziness, or nausea. If you have these signs, get fresh air at once! Have the heater inspected by a qualified service technician. Some people are more affected by carbon monoxide than others. These include pregnant women, people with heart or lung disease or anemia, those under the influence of alcohol, and those at high altitudes.
22. Failure to use manufacturer provided parts, variations in techniques and construction materials or practices other than those described in this manual may create a fire hazard and void the limited warranty.
23. Do not make any make-shift compromises during installation. Any modification or alteration may result in damage to the appliance or dwelling and will void the warranty, certification and listings of this unit.
24. These appliances are designed as supplemental heaters. Therefore, it is advisable to have an alternate heat source when installed in a dwelling.

25. **Do Not Overfire – If Heater or Chimney Connector Glows, You Are Overfiring.**
26. **DO NOT CONNECT THIS UNIT TO A CHIMNEY FLUE SERVING ANOTHER APPLIANCE.**
27. **DO NOT BURN GARBAGE OR FLAMMABLE FLUIDS SUCH AS GASOLINE, NAPHTHA OR ENGINE OIL.**
28. **This wood heater has a manufacturer-set minimum low burn rate that must not be altered. It is against federal regulations to alter this setting or otherwise operate this wood heater in a manner inconsistent with operating instructions in this manual.**

⚠ WARNING

This product can expose you to chemicals including Carbon Black, which is known to the State of California to cause cancer, and Carbon Monoxide, which is known to the State of California to cause birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov

TESTING INFORMATION

This manual describes the installation and operation of these non-catalytic wood heaters. These heaters meet the U.S. Environmental Protection Agency's emissions limits, and are compliant with 2020 EPA NSPS particulate emission standards. These heaters have been developed, tested and constructed in accordance with the requirements of UL 1482, ULC S627 and HUD standards and are listed by PFS Corporation. These heaters have been approved for residential and mobile home installations.

Model	Emission Rate	BTU/hr Output Range	Max. Output BTU/hr	Tested Average Efficiency
T2100GL	1.55 g/hr	10,491 - 30,387	76,000	71.0%

DRAFT REQUIREMENTS

This appliance is dependent upon a properly functioning chimney for optimum performance. It is a high efficiency appliance that loses much less heat up the chimney than older appliances and fireplaces. For this reason it is important to match the stove to the chimney. The chimney has two functions:

1. It draws combustion air into the appliance (without air, no fuel will burn) and
2. It exhausts combustion by-products. Your new appliance is what is known as a "natural draft" appliance.

The appliance depends solely on the natural draft of the chimney system to draw combustion air into the unit. Draft is the force that moves air from the appliance up into the chimney. The amount of draft in your chimney depends on the length of the chimney, local geography, nearby obstructions and other factors. Too much draft may cause excessive temperatures in the appliance (overfiring). Slow or inadequate draft equals poor combustion and possible smoking problems.

The following are some conditions that may contribute to poor chimney draft:

1. A chimney too large for your appliance.
2. A chimney with not enough height to produce adequate draft.
3. A chimney with excessive height (this may allow exhaust to cool too much before exiting, which will stall the rate the exhaust exits).
4. Offsets in the venting system are too restrictive (see *Chimney Guidelines)*.

Inadequate draft will cause the appliance to leak smoke into the room through the stove and the chimney connector joints.

Excessive draft may cause an uncontrollable burn or a glowing red stove or chimney part.

Overfiring Damage - If the heater or chimney connector glows, you are overfiring. Other symptoms may include: Cracking, warping or burning out of components, stove glass may develop a haze, which will not come off with cleaning.

Overfiring of a stove is a condition where excessive temperatures are reached, beyond the design capabilities of the appliance. The damage that occurs from overfiring is not covered under the manufacturer's limited warranty.

Also see *Troubleshooting* on ***Page 23***.

SELECTING THE PROPER VENTING SYSTEM

The appliance is merely one component of a larger system. The other equally important component is the venting system. This is necessary for achieving the required flow of combustion air to the fire chamber and for safely removing unwanted combustion by-products from the appliance. If the venting system's design does not promote these ends, the system may not function properly. Poorly functioning venting systems may create performance problems as well as be a safety hazard. **A draft test should read greater than .04' W.C. (inches water column) and less than .08" W.C**. As per NFPA-211 standard (see paragraph below), the installer must take into account all variables within the installation and install the appliance in such a manner that satisfies the draft requirements of the appliance. See *Chimney Guidelines* below to assist you in selecting the proper venting system for your installation.

American National Standards Institute ANSI/NFPA 211, Standard for Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances - See Draft Section: A chimney or vent shall be so designed and constructed to develop a flow sufficient to completely remove all flue and vent gases to the outside atmosphere. The venting system shall satisfy the draft requirements of the connected appliance in accordance with the manufacturer's instructions.

Chimney Guidelines:

- This appliance requires approximately 12 feet minimum of "effective draw" provided by the venting system. As a rule of thumb, every 90 degree total direction change in the venting will result in a loss of approximately 5 feet of "effective draw." Example: If two 45 degree offsets are used, subtract 5 feet from the actual vertical vent height to determine your "effective draw." In this case if you had 14 feet of vertical vent, the effective draw would only be approximately 9 feet (14 ft. - 5 ft. = 9 ft.), therefore it may be necessary to add additional height to the venting system.
- Do not install an offset within the first two feet above the flue outlet on the appliance.
- In well insulated and weather tight homes, it may be difficult to establish a good draft up your chimney. The poor draft is caused by a shortage of air in the house. In this situation an Outside Air Kit may need to be installed *(See Negative Pressure Warning on* ***Page 5*** *and Outside Combustion Air on* ***Page 12****)*.

Chimney Height Requirements

The chimney must extend 3' (.92m) above the level of roof penetration and a minimum of 2' (.61m) higher than any roof surface within 10' (3m) *(see **Figure 1**)*. Check with your local building officials for additional requirements for your area.

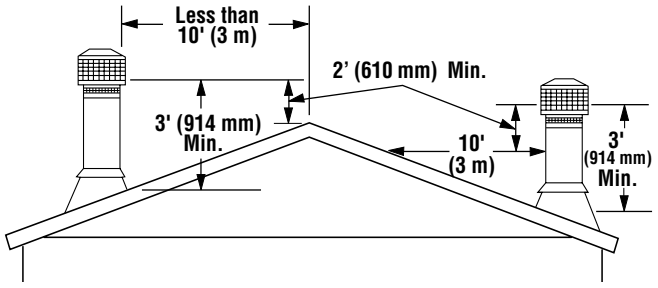


***Figure 1** - Chimney Height Requirements*

To pass inspection in nearly any jurisdiction, the chimney must meet both safety and exhaust flow requirements. The (3' by) 2' by 10' rule applies to both masonry and factory-built chimneys.

**** Ref. USA - National Standard, NFPA 211-latest edition and Canada National Standard CSA B365-01-latest edition. Vents installed with a listed cap shall terminate in accordance with the terms of the cap's listings.***

NEGATIVE PRESSURE WARNING

This appliance is not designed to be operated in a negative pressure. In very airtight homes with large kitchen exhaust fans, furnace cold air returns, fresh air exchange systems and any other air system in close proximity to the heating appliance may create a negative pressure in the same room as the heating appliance. This can create dangerous back drafting of the stove and chimney joints, drawing combustion by-products into the home. Be sure your home has adequate makeup air to eliminate negative pressures caused by the above-mentioned sources. Outside air connected to the appliance probably will not resolve such a problem as the appliance is not the source of negative pressure. IHP accepts no liability for damages resulting from negative pressures described here.

Ventilation Requirements - Provide adequate air for combustion. The fresh air requirements of this appliance must be met within the space where it will be installed. Ventilation is essential when using a Solid-Fuel-Burning heater. In well insulated and weather tight homes, it may be difficult to establish a good draft up the chimney (caused by a shortage of air in the home). The lack of air is caused by many common household appliances which exhaust air from the home (such as a furnace, heat pump, air conditioner, clothes dryer, exhaust fans, fireplaces, and other fuel burning appliances). Also, the combustion process of this heater uses oxygen from inside the dwelling. If the available fresh air delivery in the dwelling is insufficient to support the demands of these appliances, problems can result (i.e. excessive negative pressure can develop in the dwelling which will affect the rate at which this appliance can draft thus resulting in performance problems. To correct this problem it may help to open a window (preferably on the windward side of the house) or install an optional outside air kit.

CLEARANCES TO COMBUSTIBLES

WARNING: BE ABSOLUTELY SURE THE DISTANCE BETWEEN THE HEATER AND THE SURFACE OF ANY COMBUSTIBLE CONSTRUCTION IS NOT LESS THAN SHOWN IN THE FIGURES ON PAGE 7.

Floor Protection

USA - The floor in front and under the heater must be protected with noncombustible material. The covering must extend 16" in front of the door opening of the heater and 8" to either side of the door opening.

Canada - The floor in front and under the heater must be protected with noncombustible material. The covering must extend 450 mm in front of the door opening of the heater and 200 mm to either side of the stove body and 200 mm to the rear or to the wall, whichever is smaller.

USA and Canada - A chimney connector / venting extends horizontally over the floor, protection must also cover the floor under the connector / venting and at least 2" (51 mm) to either side.

CHIMNEY AND CONNECTOR

Minimum 6" diameter, minimum 24 MSG black steel connector pipe with UL103HT listed factory-built chimney suitable for use with solid fuels or masonry chimney. Horizontal connection not tested, refer to local building codes for installation. See installation instructions for details. Restrictions apply! Read instructions before installing.

Residential chimney systems must be from the same brands as listed for mobile homes but connector pipe may be double wall, single wall or single wall with shield as listed above.

This appliance may be vented into a code-approved masonry chimney with flue liner.

WARNING: CHIMNEY CONNECTOR MUST BE IN GOOD CONDITION AND KEPT CLEAN. DO NOT INSTALL DAMAGED PARTS.

All of the stove connector pipe used must be of the same brand. The chimney that the stove pipe transitions into may be a different brand. Other than the transition of the stove pipe into the chimney, do Not mix different brand vent components. Install all vent components per vent manufacturer's instructions.

The chimney connector shall not pass through an attic or roof space, closet or similar concealed space, or a floor, or ceiling. Where passage through a wall, or partition of combustible construction is desired, the installation shall conform to CAN/CSA-B365, Installation Code for Solid-Fuel-Burning Appliances and Equipment.

There must be an effective vapor barrier at the location where the chimney or other component penetrates to the exterior of the structure. Follow the vent manufacturer's detailed instructions.

IMPORTANT NOTE: See *Draft Requirements* and *Selecting a Proper Venting System* on ***Page 4*** to assist you in choosing the proper venting system for your installation.

Clearance dimensions are to flue collar. If a single wall connector pipe with shield is used, a 1 inch air space is needed between pipe and shield. Shield attaches to rear of stove pipe and must run from stove top to ceiling. Pipe shield shall be UL listed.

NOTE: DIAGRAMS & ILLUSTRATIONS ARE NOT TO SCALE.

INSTALLATION CLEARANCES - REFER TO *FIGURES 2, 3 AND 4*

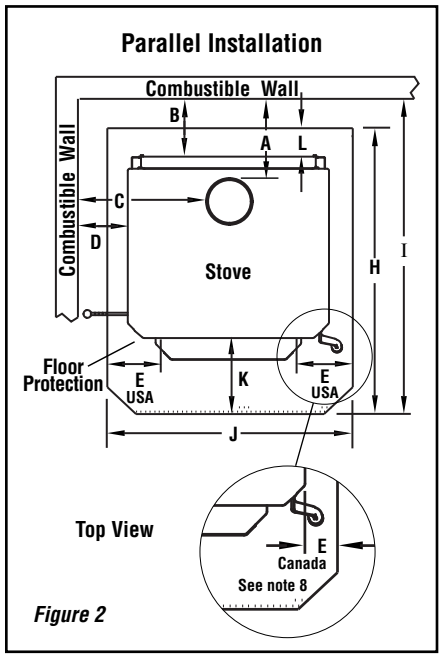


Figure 2

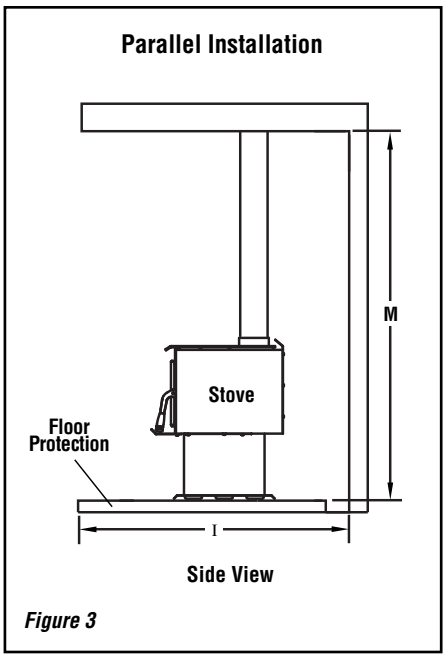


Figure 3

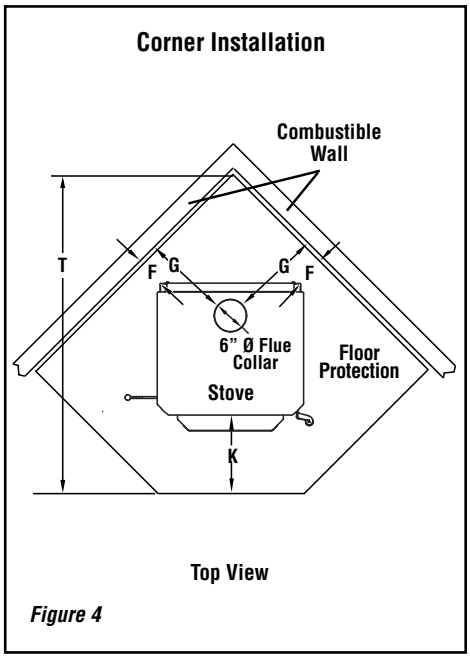


Figure 4

USA - inches (millimeters)

PIPE	INSTALLATION	A (3)	B (1)	C (3)	D (1)	E (8)	F (1)	G (3)	H (2)	I (6)	J (2)	K (7)	L (5)	M	T (6)
Single Wall	Residential	14-1/4 (362)	11-1/2 (292)	23 (584)	13-3/8 (340)	8 (200)	9 (229)	18 (457)	37-5/8 (956)	49 (1245)	34-7/8 (886)	16 (406)	0 (0)	84 (2134)	61-1/2 (1562)
Double Wall	Residential or Mobile Home	12 (305)	9-1/8 (232)	19-1/2 (495)	9-5/8 (245)	8 (200)	6 (152)	15 (381)	37-5/8 (956)	46-3/4 (1188)	34-7/8 (886)	16 (406)	0 (0)	84 (2134)	57-1/2 (1461)

CANADA - inches (millimeters)

PIPE	INSTALLATION	A (3)	B (1)	C (3)	D (1)	E (8)	F (1)	G (3)	H (2)	I (6)	J (2)	K (7)	L (5)	M	T (6)
Single Wall	Residential	14-1/4 (362)	11-1/2 (292)	23 (584)	13-3/8 (340)	8 (200)	9 (229)	18 (457)	47-5/8 (1210)	51 (1295)	40-7/8 (1038)	18 (450)	8 (200)	84 (2134)	63-1/2 (1613)
Double Wall	Residential or Mobile Home	12 (305)	9-1/8 (232)	19-1/2 (495)	9-5/8 (245)	8 (200)	6 (152)	15 (381)	47-5/8 (1210)	48-3/4 (1238)	40-7/8 (1038)	18 (450)	8 (200)	84 (2134)	59-1/2 (1511)

Footnotes:

1- These dimensions to the stove body are for reference only. Actual distances should be measured from the stove's flue collar.

2- Minimum noncombustible hearth pad dimensions.

3- Clearances to connector pipe shall be measured from the flue collar of the stove.

5- In corner applications, when installed at minimum back wall clearances, the required floor protection is dimensioned off the back plane of the stove, therefore the floor protection required off the back corners (at a 45 degree angle) only needs to extend to the wall. This situation will only occur in CANADA installations.

6- Reference dimension only, to assist in planning the installation.

7- Measured from front of floor protection to the front of firebox.

8- USA=8" (200mm) from door opening, Canada=8" (200mm) from sides and back of unit.

NOTE: DIAGRAMS & ILLUSTRATIONS ARE NOT TO SCALE.

SPECIFICATIONS - Tahoma™ 2100GL

Product Reference Information			
Cat. No.	*Description*	*Ship. Weight*	*Ship. Volume*
TBD	Tahoma™ 2100GL Wood-Burning Stove	310 lb.	23 cu. ft.

NOTES:

- *Dimensions shown are approximations only (+/- 1/4")*
- *Diagrams, illustrations and photographs are not to scale – consult installation instructions. Product designs, materials, dimensions, specifications, colors and prices are subject to change or discontinuance without notice.*
- *Approved for residential and manufactured home installations.*
- *Optional Kits Available:*

  Blower
  Outside Air Kit

❶ *Square-foot heating capacities and burn times are approximations only. Actual performance may vary depending upon home design and insulation, ceiling heights, climate, condition and type of wood used, appliance location, burn rate, accessories chosen, chimney installation and how the appliance is operated.*

Specifications

Stove Pipe Diameter Single Wall or Double Wall	**6" (152 mm)**
Log Length	**20" Max. (508 mm Max.)**
Firebox	**Volume = 2.1 cu. ft.**
Cord Wood: ❶	**76,000 BTUs/hr.**
Maximum Burn Times ❶	**7-9 hours**
Heating Capacity ❶	**1,200 to 2,000 sq. ft.**
EPA Grams Per Hour	**1.55 gr/hr**

EPA Certified and Washington State Approved

Listing

The Tahoma™ 2100GL woodstove is safety listed with the following agency:

- *PFS Corporation, Tested to UL 1482, ULC S627*

Report # 14-193

Dimensions

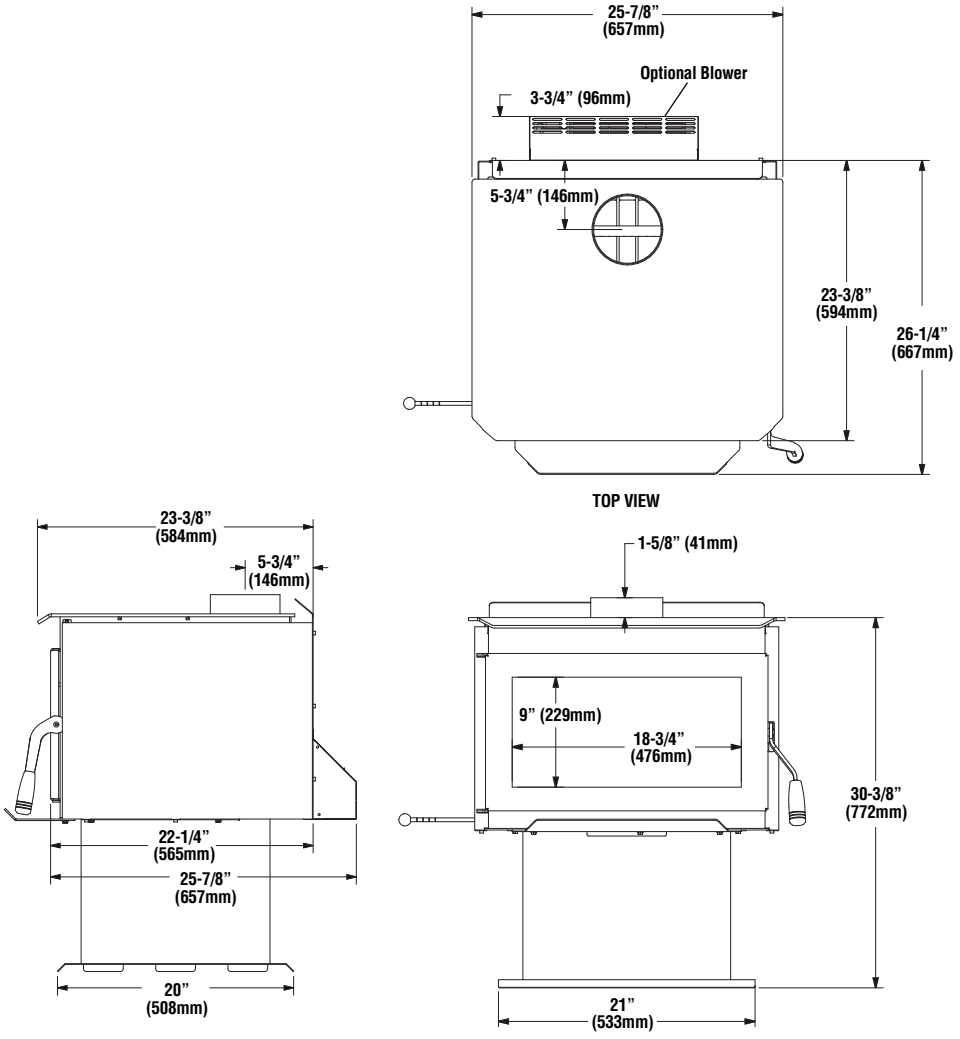


Figure 5

NOTE: DIAGRAMS & ILLUSTRATIONS ARE NOT TO SCALE.

TYPICAL INSTALLATIONS

YOUR CHIMNEY INSTALLATION MUST COMPLY WITH LOCAL BUILDING AND FIRE CODES.

Single Wall Pipe
Using 6” Diameter Single Wall Connector Pipe

INSTALL VENTING SYSTEM PER VENT MANUFACTURERS INSTRUCTIONS!

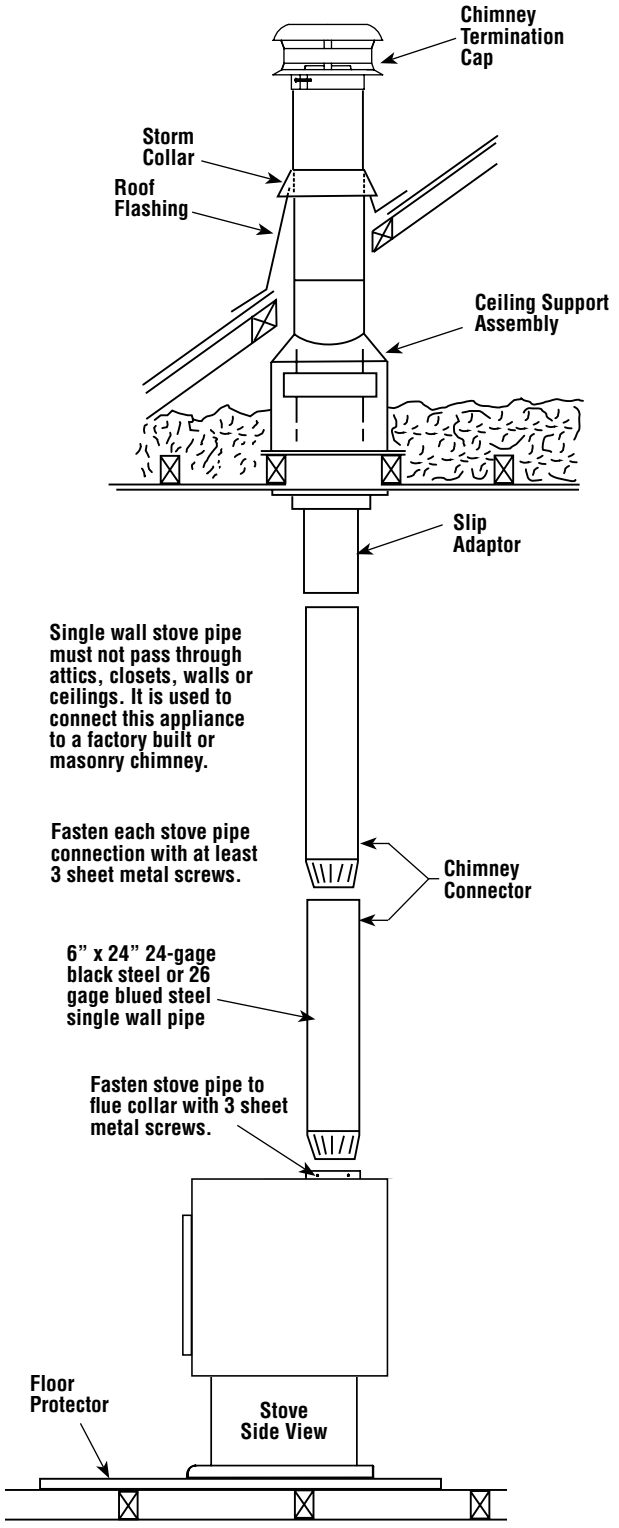


Figure 6 - Typical Installation

NOTE: DIAGRAMS & ILLUSTRATIONS ARE NOT TO SCALE.

CHIMNEY INSTALLATION

- Install chimney as per manufacturer's instructions. Some brands of pipe may require removal of the spacer ring in the flue collar.
- All horizontal runs of pipe should be as short as possible and are required by NFPA No. 211 to have an upward pitch or rise in the same direction the smoke travels of no less than 1/4" to the linear foot. The connector pipe must meet minimum clearances in any direction to walls or other combustible materials. It must attach to a listed double wall metal chimney at least 6" in diameter or to a masonry chimney with a flue passage of at least 48 square inches.
- It is required that a chimney connector pipe not extend further than the inner wall of the flue when it is connected to a masonry chimney and that it either be cemented to the masonry or be installed without cement in a thimble connected to the masonry wall. When the connector is inserted into a thimble, the joint must be tight enough so that it will not be dislodged in normal use.
- Chimney connector pipes should never pass through a floor, ceiling, fire wall, partition, or combustible construction of any type unless certain precautions are taken. The best method is to use a listed thimble and a listed chimney in accordance with the manufacturer's directions. NFPA No. 211 gives approved methods for passing a flue pipe through combustible constructions *(see **Page 11**)*.

Manufactured Home Installations *(ref. **Figure 8**)*

This appliance is approved for installation into a manufactured (mobile) home.

Installation should be in accordance with the Mobile Home Construction and Safety Standard, Title 24 CFR, Part 3280 (in Canada CAN/CSA Z240 MH), or, when such a standard is not applicable, the Standard for Mobile Home Installations, ANSI A225.1.

All mobile home installations require an outside air kit (see ***Page 24*** for ordering information). The stove must be secured to the floor and grounded to the chassis of the mobile home.

WARNING: DO NOT INSTALL IN SLEEPING ROOM OF A MOBILE HOME.

CAUTION: THE STRUCTURAL INTEGRITY OF THE MOBILE HOME FLOOR, WALL AND CEILING/ROOF MUST BE MAINTAINED.

Approved Chimney - Your stove is approved for use with Class A, UL 103 HT (U.S.) / ULC-S629 (Canada) Listed Residential Type and Building Heating Appliance Chimney (HT chimney - 2100° Fahrenheit) and double wall connector pipe**.** Approved chimney brands are Security Chimneys™, Jakes Evans/GSW, Dura-vent, Metal Fab, Ameri-Tec, Metalbestos and Industrial Chimney (ICC).

Clearances to connector shall be measured from 6" flue collar. Restrictions apply! Read instructions before installing.

YOUR CHIMNEY INSTALLATION MUST COMPLY WITH LOCAL BUILDING AND FIRE CODES.

Double Wall Pipe
Using 6" Diameter Type L-Vent Connector Pipe
Manufactured (Mobile) Home Installation Shown

INSTALL VENTING SYSTEM PER VENT MANUFACTURERS INSTRUCTIONS!

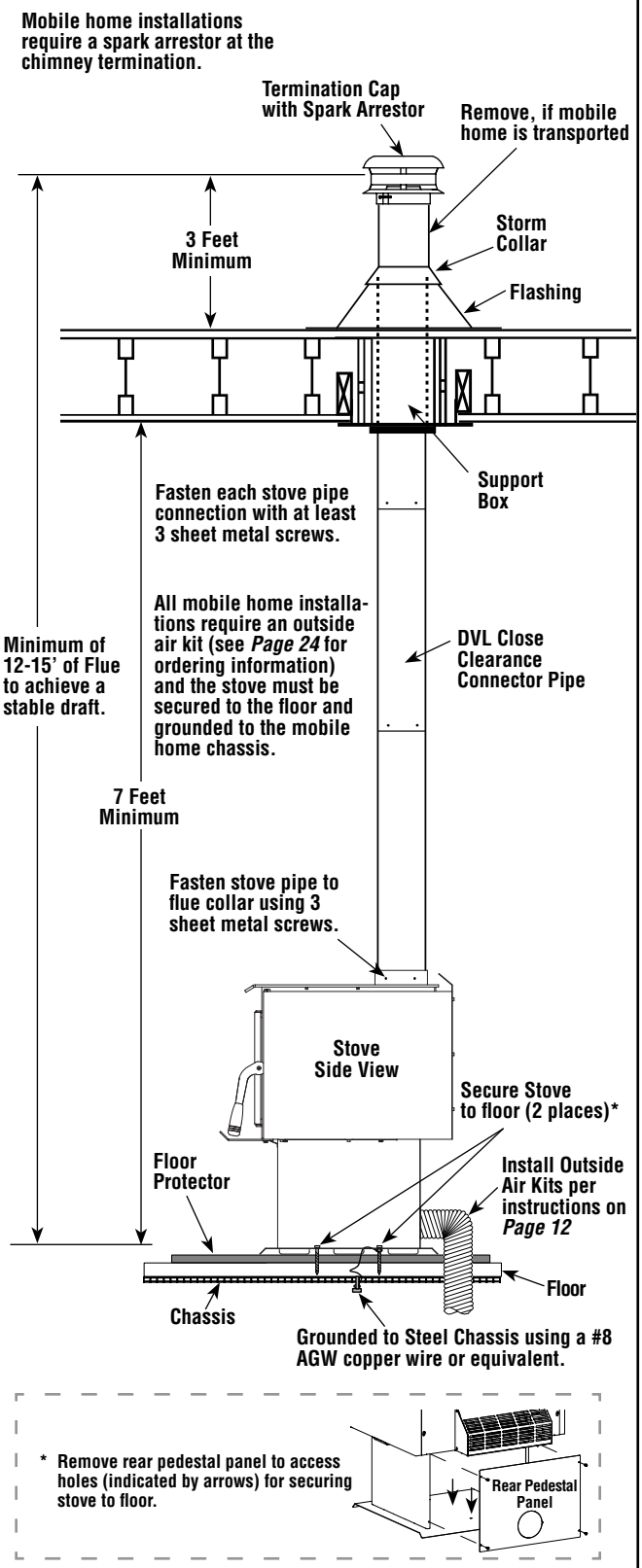


Figure 8 - Typical Installation

NOTE: DIAGRAMS & ILLUSTRATIONS ARE NOT TO SCALE.

Chimney Connector Systems and Clearances from Combustible Walls for Residential Heating Appliances (NFPA 211) - Refer to *Figure 9*

System A. Minimum 3.5 in. (90 mm) thick brick masonry wall framed into combustible wall with a minimum of 12 in. (305 mm) brick separation from clay liner to combustibles. Fireclay liner (ASTM C 315, Standard Specification for Clay Flue Linings, or equivalent), minimum 5/8 in. (16 mm) wall thickness, shall run from outer surface of brick wall to, but not beyond, the inner surface of chimney flue liner and shall be firmly cemented in place.

Clearance: 12 in. (305 mm)

System B. Solid-insulated, listed factory-built chimney length of the same inside diameter as the chimney connector and having 1 in. (25.4 mm) or more of insulation with a minimum 9 in. (229 mm) air space between the outer wall of the chimney length and combustibles.

The inner end of the chimney length shall be flush with the inside of the masonry chimney flue and shall be sealed to the flue and to the brick masonry penetration with non-water-soluble refractory cement. Supports shall be securely fastened to wall surfaces on all sides.

Fasteners between supports and the chimney length shall not penetrate the chimney liner.

Clearance: 9 in. (229 mm)

System C. Sheet steel chimney connector, minimum 24 gage [0.024 in. (0.61 mm)] in thickness, with a ventilated thimble, minimum 24 gage [0.024 in. (0.61 mm)] in thickness, having two 1 in. (25.4 mm) air channels, separated from combustibles by a minimum of 6 in. (152 mm) of glass fiber insulation. Opening shall be covered, and thimble supported with a sheet steel support, minimum 24 gage [0.024 in. (0.61 mm)] in thickness.

Supports shall be securely fastened to wall surfaces on all sides and shall be sized to fit and hold chimney section. Fasteners used to secure chimney section shall not penetrate chimney flue liner.

Clearance: 6 in. (152 mm)

System D. Solid-insulated, listed factory-built chimney length with an inside diameter 2 in. (51 mm) larger than the chimney connector and having 1 in. (25.4 mm) or more of insulation, serving as a pass-through for a single wall sheet steel chimney connector of minimum 24 gage [0.024 in. (0.61 mm)] thickness, with a minimum 2 in. (51 mm) air space between the outer wall of chimney section and combustibles. Minimum length of chimney section shall be 12 in. (305 mm). Chimney section concentric with and spaced 1 in. (25.4 mm) away from connector by means of sheet steel support plates on both ends of chimney section. Opening shall be covered, and chimney section supported on both sides with sheet steel supports of minimum 24 gage [0.024 in. (0.61 mm)] thickness.

Supports shall be securely fastened to wall surfaces on all sides and shall be sized to fit and hold chimney section. Fasteners used to secure chimney section shall not penetrate chimney flue liner.

Clearance: 2 in. (51 mm)

Additional requirements:

1. **Insulation material used as part of wall pass-through system shall be of noncombustible material and shall have a thermal conductivity of 1.0 Btu-in./hr-ft² - ºF (4.88 kg-cal/hr-m² - ºC) or less.**
2. **All clearances and thicknesses are minimums; larger clearances and thicknesses shall be permitted.**
3. **Any material used to close up an opening for the connector shall be of noncombustible material.**
4. **A connector to a masonry chimney, except for System B, shall extend in one continuous piece through the wall pass-through system and the chimney wall to the inner face of the flue liner, but not beyond.**

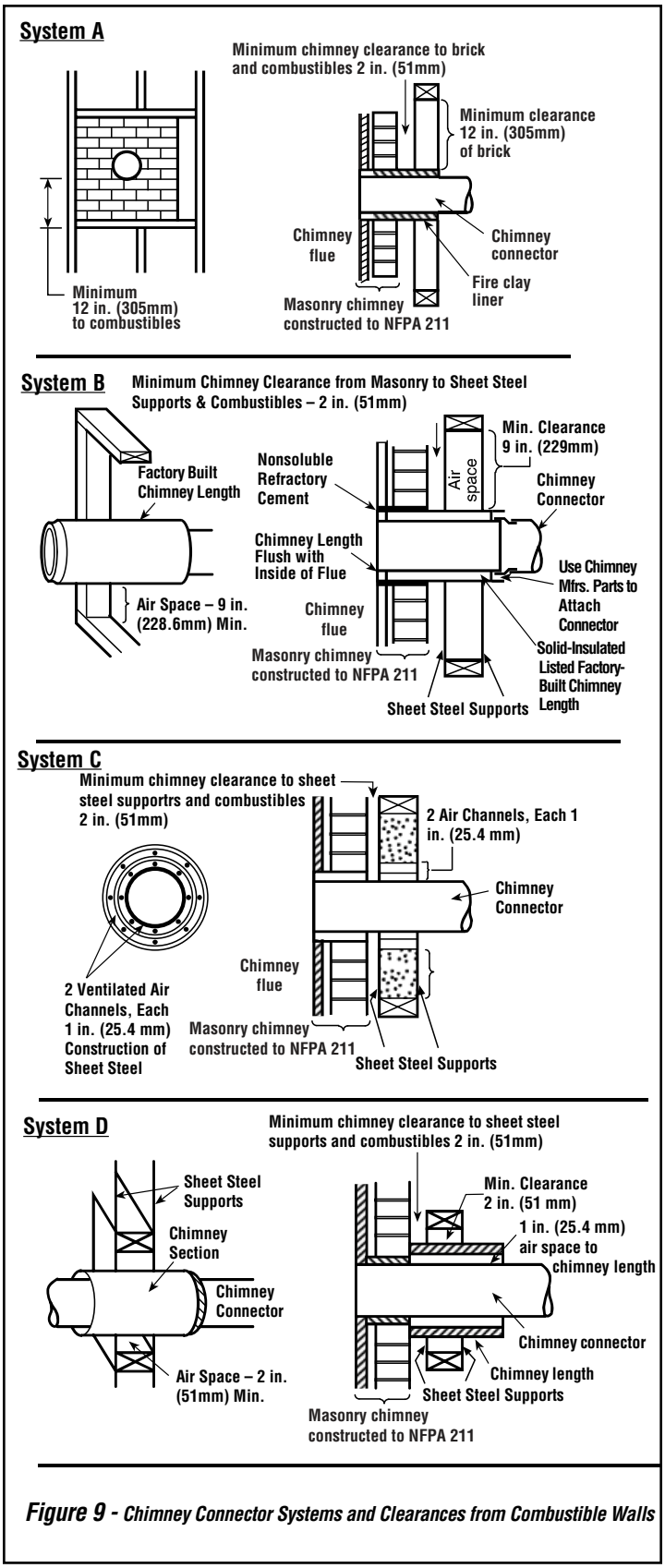


***Figure 9** - Chimney Connector Systems and Clearances from Combustible Walls*

NOTE: DIAGRAMS & ILLUSTRATIONS ARE NOT TO SCALE.

OUTSIDE COMBUSTION AIR KIT INSTALLATION

Outside Air Kits

Order:

1 ea. P/N UZIAD Outside Air Coupler Kit (connects outside air ducting, UZI, to stove)
AND
1 ea. P/N UZI Outside Air Ducting Kit (includes 4" insulated flex x 10' long)
AND
1 ea. P/N H8874 Outside Air Panel and Air Channel Kit (includes rear pedestal panel and side and front air channels)

An outside air kit is required in Manufactured (mobile) Home installations. For residential installations, check with local authorities having jurisdiction in your area, it may be mandatory.

INSTALLATION INSTRUCTIONS

1. **(Manufactured Home Installations Only)** Secure stove to floor per instructions in ***Figure 8*** on ***Page 10***.
2. **Install rear pedestal panel as shown in *Figure 11***.
3. **Install Outside Air Coupler** - Line up the "V" notch in the coupler with the "V" notch in the opening on the back of the pedestal *(see **Figure 11**)*. Push and twist so the rolled edge catches and continue turning a full 360° to lock the coupler in place.
4. **Install Ducting and Air Register *(refer to Figures 11 through 13)*** - The outside air assembly may be installed according to the following requirements:
   a) Duct length should be kept to a minimum.
   b) The air intake register must not be installed more than ten (10) feet (3050 mm) above the base of the stove.
   c) The fresh air must come from outside the house. The air intake must not draw air from the attic, from the basement or garage.
   d) The air intake should be installed where it is not likely to be blocked by snow or exposed to extreme wind and away from automobile exhaust fumes, gas meters and other vents.
   e) The duct and register may be installed above or below floor level.

   - Make a 4-1/4" (110 mm) hole in the outside wall of the house at the chosen location. From outside, place the outside air register in the hole (open side down) and fasten the register to the wall, with screws as shown *(see **Figures 12B and 13**)*.
   - Install the coupler onto the existing collar on stove *(see **Figure 11**)*.
   - Attach the duct to the coupler on stove *(see **Figures 12A and 12B**)*. Using the aluminium tape provided, wrap the tape around the joint between the flexible duct and the air inlet.
5. **Install Front and Side Air Channels** - Install the front and side air channels per the instructions in ***Figure 14*** on ***Page 13***.

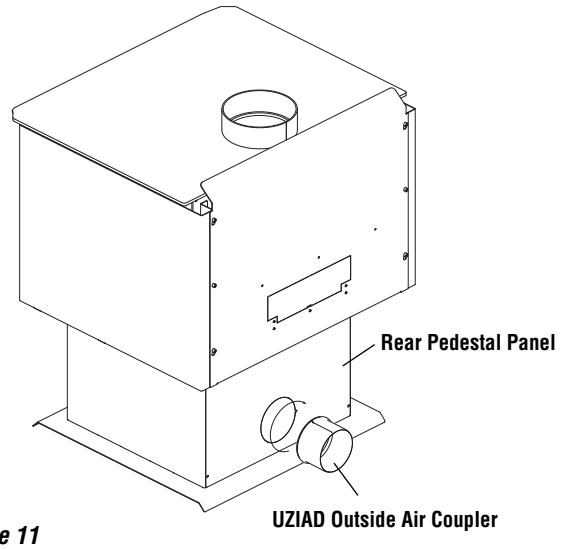


Figure 11

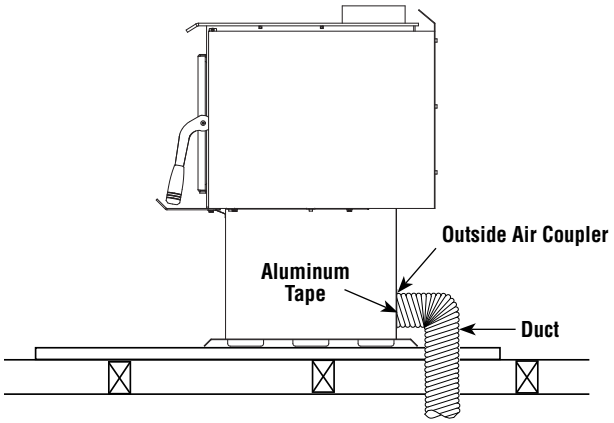


Figure 12A - Outside Air Connection, Through the Floor

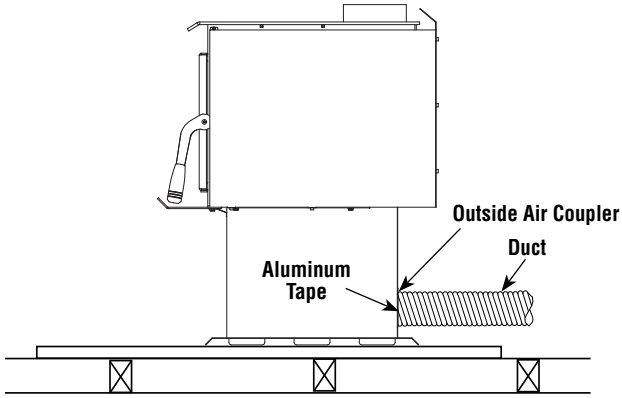


Figure 12B - Outside Air Connection, Through the Wall

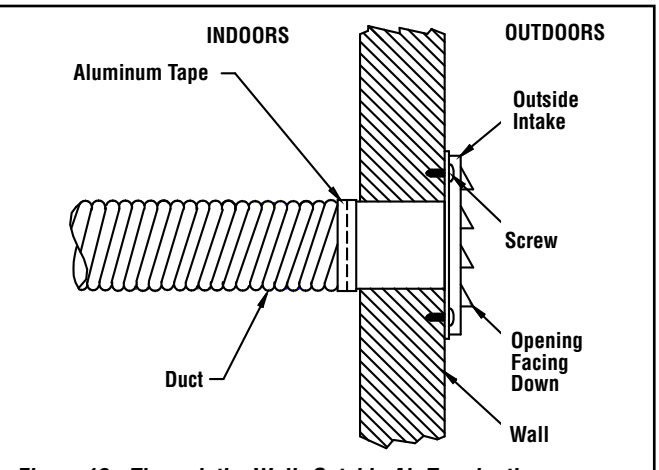
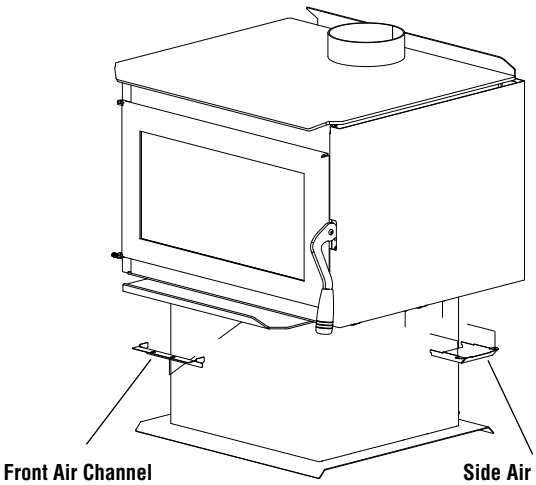
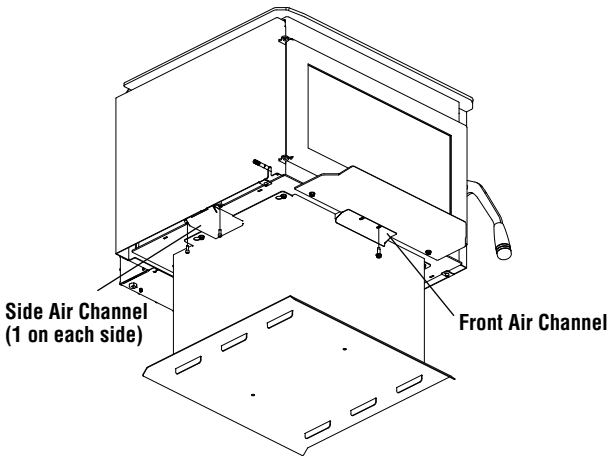


Figure 13 - Through the Wall, Outside Air Termination

See *Figure 8 on Page 10* for additional Manufactured Home requirements.

NOTE: DIAGRAMS & ILLUSTRATIONS ARE NOT TO SCALE.





Using the existing screws on the stove, install the front and side air channels as shown here.

Figure 14 - Install Front and Side Air Channels

BRICK INSTALLATION

CAUTION: Wear gloves during brick installation in case of sharp edges inside the stove.

Measure bricks before installing, as per list of dimensions in ***Figure 15***.

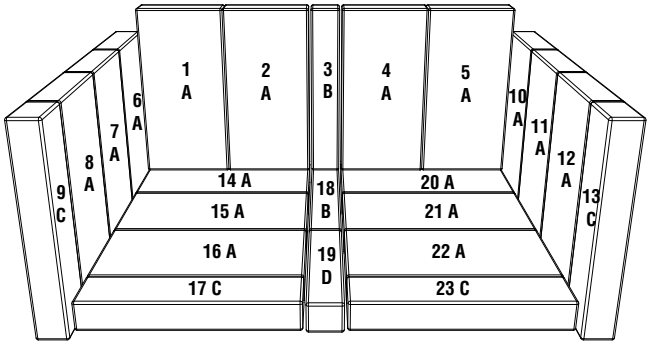
1. Install the brick as shown in ***Figure 15***.
2. The baffle boards are pre-installed. Ensure that they have not moved during shipping. Make sure all three baffle boards are resting on top of the secondary tubes, placed edge to edge, and positioned fully against the rear of the unit.

   CAUTION: It is critical that baffle boards are fully against the rear of the unit.

   These brick sizes may be slightly smaller to adjust for steel and firebrick tolerances beyond our control. Be sure to measure and mark bricks with their numbers when removing.

WARNING: IF THE BRICKS ARE NOT INSTALLED EXACTLY AS SHOWN, THEY COULD FALL OUT OF PLACE DURING REFUELING OR BURNING OF THE STOVE CAUSING SERIOUS INJURY.

Firebox Brick Layout as Viewed from the Front



Brick Sizes	
A = 4-1/2"x 9"	C = 2-1/8"x 9"
B = 1-1/2"x 9"	D = 1-1/2"x 6-3/4"

*** Bricks 6 and 10 fit up against the back of the firebox.**

Figure 15

Side Cut-A-Way View of Firebox

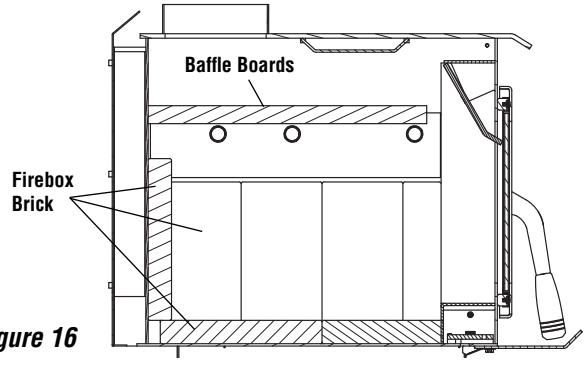


Figure 16

NOTE: DIAGRAMS & ILLUSTRATIONS ARE NOT TO SCALE.

FOR MOBILE HOME INSTALLS:

- ☐ Be sure the stove is properly grounded
- ☐ Be sure the stove is properly securely fastened to the floor
- ☐ Be sure the outside air vent is free of obstructions and has a mesh screen in place



POST INSTALLATION CHECKS

- ☐ Check that all chimney pipe joints are secured and installed according to the manufacturers instruction.
- ☐ If used, make sure the outside air kit is properly installed and unobstructed.
- ☐ Double check all stove clearances.
- ☐ Be sure bricks and baffle boards are properly installed.



FOR YOUR OWN PROTECTION AND INSURANCE PURPOSES, HAVE YOUR CHIMNEY AND CONNECTOR PIPE INSTALLATION INSPECTED BY YOUR LOCAL BUILDING CODE AUTHORITY OR FIRE MARSHAL BEFORE STARTING A FIRE IN YOUR STOVE. NOTIFY YOUR INSURANCE COMPANY.

NOTE: DIAGRAMS & ILLUSTRATIONS ARE NOT TO SCALE.

PAINT CURING

Do not close the door tightly during the "Burn-In Period." Also, open the door frequently (every 5-10 minutes) to keep the gasket from adhering to the curing paint. Ventilate the house well during these first firings as the paint gives off carbon dioxide and unpleasant odors. It is recommended that persons sensitive to an imbalance in the indoor air quality avoid the appliance during the curing process.

Your new appliance is painted with a high temperature paint that cures during the first few firings. We recommend that you put your stove or fireplace insert through a regimen of three burns. The first two should last for 20 minutes each at 250 degrees (the appliance should be allowed to cool completely between each burn). The third should be a burn of at least 450 degrees F. for 45-60 minutes. The paint will become soft, gummy and emit non-toxic smoke during these burns. After the appliance cools down for the third time, the paint will harden. **DO NOT BUILD A LARGE ROARING FIRE UNTIL THIS CURING EFFECT IS COMPLETE OR YOU MAY DAMAGE THE FINISH OF YOUR STOVE.** Spray can touch-ups should be done only with a high temperature stove paint (cat. no. H8159), available from all IHP dealers.

OPERATING HINTS

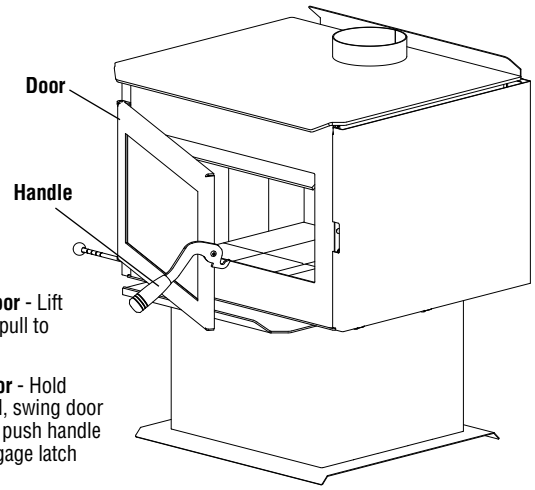
1. Burn only dry, well-seasoned cord wood. In some states it is illegal to burn wet wood or anything other than clean, dry wood products.
2. Your stove or fireplace insert is designed to operate with the door closed! Operate only with the door shut tightly at all times except when loading wood and possibly on start up to establish a draft. Never leave the unit unattended while the front door is opened.
3. **DO NOT** contact or move the baffle boards while loading wood. Occasionally check the baffle to assure that the boards are in there correct location.
4. **CAUTION: THE DRAFT CONTROL MUST BE FULLY OPEN BEFORE OPENING THE DOOR TO AVOID POSSIBLE COMBUSTION FLASH!!** (Ignition of hot volatile gases as the door is opened).
5. Feeding excessive amounts of fuel to the appliance should be avoided. It is important to supply it with sufficient draft and fuel to maintain a moderately hot fire. If, during overnight burns, heavy creosote deposits develop inside your stove and on the door, the draft is set too low - review your burning habits!

DOOR OPERATION

Do not operate the appliance with the door open or ajar other than possibly during start up to create a draft (Do not leave the unit unattended while the front door is slightly open during start up). Operating the appliance with the door open other than in initial start up if needed will produce extreme temperatures within the appliance. Damage caused from over-firing is not covered under the manufacturers limited warranty.

⚠ WARNING

Be careful not to abuse door assembly by striking or slamming it. If the door assembly or glass is broken or damaged, they must be replaced with factory original parts before heater can be safely operated. Use only components provided by the manufacturer as replacement parts.



Opening Door - Lift handle and pull to open door

Closing Door - Hold handle lifted, swing door closed then push handle down to engage latch

Figure 18

NOTE: DIAGRAMS & ILLUSTRATIONS ARE NOT TO SCALE.

STARTING AND MAINTAINING A FIRE

1. **NEVER USE FLAMMABLE LIQUIDS TO START OR REKINDLE A SOLID FUEL FIRE!!**
2. Fully open the primary draft control by placing draft control (wood handle located on left side of the stove) in the highest position. This control determines the amount of air entering the stove. Lowering this control reduces the burn rate of the stove.
3. Place a small amount of crumpled paper in the front of the firebox and cover it with a few pieces of kindling.
4. Light the paper and allow sufficient time for the kindling to become fully engulfed in flames. You will now close the wood units front door. Your wood units front door may or may not need to be left slightly open during this start up process, this depends on the stove model and the amount of draft present.
5. **When operating any wood burning appliance, it is important to become familiar with how the damper control affects heat output and the overall temperature of the appliance. A stove thermometer can be a helpful tool to help ensure you are not over-firing your appliance and it will also ensure you are burning fuel at a rate that is most efficient. Place a stove thermometer on the top of the appliance as shown in *Figure 19*. Monitor the temperature every 15 minutes or so until you become more familiar with your appliance. Close the damper all the way down if you begin to reach 600 degrees, as this is a sign that you are operating your appliance at too high a temperature.**

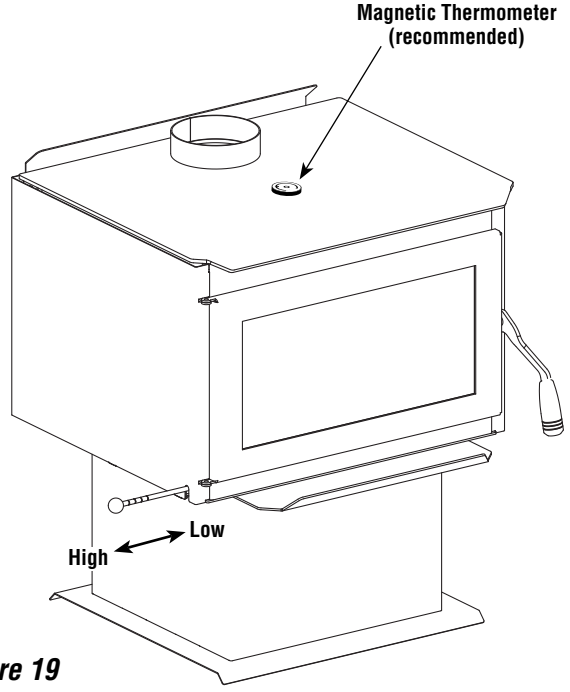


Figure 19

DO NOT LEAVE THE STOVE UNATTENDED WHILE THE FRONT DOOR IS SLIGHTLY OPEN.

CAUTION: Do Not alter the adjustment range of the draft control for increased firing for any reason.

Operate only with fuel door closed. Maintain all seals in good condition. Do not operate with broken glass.

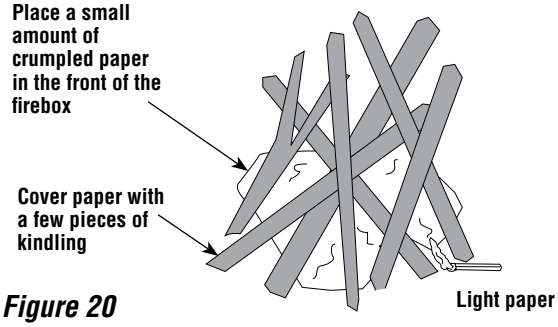


Figure 20

SEE MAINTENANCE SECTION FOR GLASS CLEANING GUIDELINES AND TIPS FOR KEEPING THE GLASS CLEAN *(Page 22)*.

6. Once kindling is burning well, larger pieces of wood may be added, then the door should be fully closed if there was the need to keep it slightly open during start up.
7. For best results, use smaller pieces of wood to get the appliance temperature very high before loading larger wood for sustained burns. If necessary, crack the door to allow ignition of the fuel charge. Now you can add larger pieces of wood and after several minutes of high burn, set the left control for the desired heat output. Check the exhaust in about 15 to 20 minutes *(see **Figure 22**)*. Large amounts of smoke indicate an improper burn setting (either too high or too low). Adjust and recheck in 5 to 10 minutes.

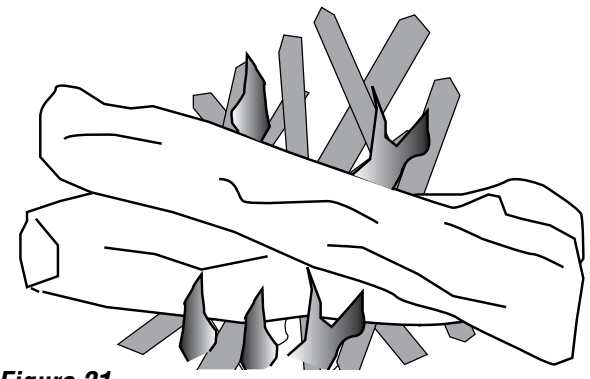


Figure 21

NOTE: DIAGRAMS & ILLUSTRATIONS ARE NOT TO SCALE.

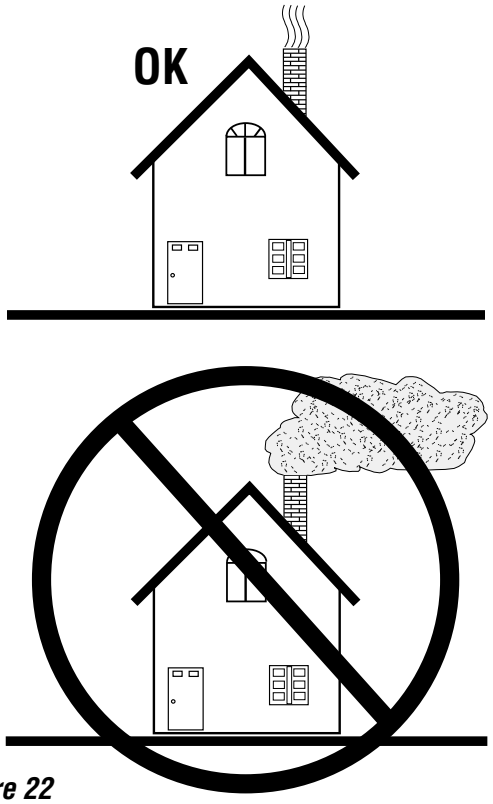


Figure 22

FUEL

This appliance is designed to burn dry seasoned natural wood only (see *Page 20* for a list of prohibited fuels). Failure to burn proper fuels only will void the certification and the warranty of the appliance.

Dry, seasoned wood is that which has been cut, split and allowed to dry under a covered area where air is free to flow and circulate under and around the wood (not under a tarp or plastic). Make sure wood is not stacked directly on the ground, it may absorb moisture from the ground. It should be allowed to dry in these conditions for a minimum of six months, preferably one year or more. **IT MUST BE UNDERSTOOD THAT WOOD CANNOT BE LEFT IN ANY KIND OF WET OR DAMP AREA OR IT WILL NEVER BECOME COMPLETELY SEASONED.**

Do Not store fuel within space heater installation clearances or within the space required for refueling and ash removal.

DO NOT OVERFIRE THIS HEATER

Attempts to achieve heat output rates that exceed heater design specifications can result in permanent damage to the heater.

What does "Well-Seasoned" mean?

When a tree is cut down, the wood is green, full of sap and moisture. This moisture content can exceed 80%, which must be reduced to less than 20%. Wood properly seasoned is then capable of generating the heat the stove was designed to provide.

Green wood does not burn easily. Attempting to burn green wood often results in a lot of smoke and very little fire. Time is the most important factor in seasoning wood. Ideally the moisture content should be reduced to 11-20%. ***NOTE: The use of a firewood moisture meter is recommended to ensure the firewood contains less than 20% moisture.***

Seasoning Guide
Softwoods – 6 months to 18 months
Hardwoods – 12 months to 24 months

Logs that are 5" diameter across or larger should be split in half, three pieces if over 8 inches, and four pieces when over a foot across. If a tree has been dead for 2 – 4 years it still needs to be cut, split, and seasoned for 6 to 24 months depending on the wood.

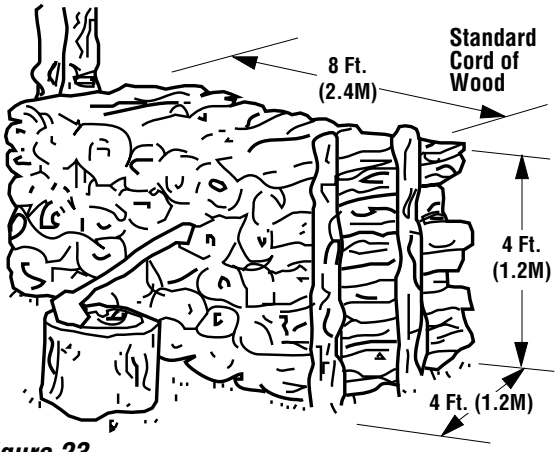


Figure 23

NOTE: DIAGRAMS & ILLUSTRATIONS ARE NOT TO SCALE.

GETTING THE MOST OUT OF YOUR STOVE

Recent developments in wood-burning technology have made wood-burning a cleaner and more convenient way to heat your home. Overall efficiency in a wood-burning appliance is a combination of combustion efficiency and heat transfer efficiency. Whether heating your entire home or just a room or two, your understanding of how to best operate your stove or insert will enhance its overall efficiency and performance. What this can mean to you is longer, cleaner burns, less wood use and more heat.

The following sections will outline techniques you can use to "get the most out of your stove." Please read them carefully.

MAXIMIZING YOUR STOVE'S OVERALL EFFICIENCY

It is important to know that for clean highly efficient burns you will need to have sufficient temperatures inside the firebox for thorough combustion. The best method for determining if you have sufficient temperatures is to watch the brick lining in your firebox. When you first light your stove or fireplace insert, the firebrick will turn a dark brown or black. After 20 to 30 minutes of a hot fire, most of the bricks should return to near their original beige color. This means the firebrick have reached a high enough temperature for your stove to achieve high combustion efficiency and you are ready to adjust the draft control to a lower setting.

Second and just as important, is achieving a high level of heat transfer efficiency. Slowing the rate of flow through the stove or insert enhances heat transfer, thus allowing more time for heat to be transferred into your home. To do this, be sure to thoroughly preheat your stove and then reduce the amount of primary air by closing the draft control down to a lower setting. (More air may produce a slightly greater amount of heat, but will greatly increase wood consumption).

To get the most out of your appliance, you will need to combine good combustion efficiency with good heat transfer practices. The following are some tips on how to operate your stove to achieve the highest overall efficiency.

1. Thoroughly preheat your stove before slowing the burn rate by closing the draft control.
2. When loading wood into a preheated stove or fireplace insert, allow a vigorous fire to build before lowering the draft control.
3. Operate your stove as much as possible in the low to medium burn ranges.
4. Do not lower the draft setting so low as to completely extinguish the flames in the firebox. Check for at least some small flames twenty minutes after setting the draft control.
5. Do not continually operate your stove or fireplace insert in the high (wide open) setting. This wastes wood by carrying a great deal of heat up the chimney and can damage your stove or fireplace insert and chimney.
6. Go outside and check your chimney. More than a very small amount of smoke indicates wasted heat, creosote build up and pollution *(see **Figure 22**)*.

ACHIEVING CLEAN, LONG BURNS

To achieve long burn times, after having thoroughly preheated the stove, load the firebox without blocking the small air opening found in the center front of the firebox. At this point, you may need to burn the stove with the draft open for a few minutes to ignite the wood. All IHP stoves are EPA tested for emissions at low burn with the air control completely closed. Whether or not you should burn your stove with the air control completely closed will depend on the following factors:

- How you load your wood
- Your chimney type, height and draft
- Your wood type and its moisture content
- The temperature of the appliance
- Which model stove or insert you have

In order to maximize the burn time of your stove you may need to experiment to get the right balance of starting temperature, wood type, and draft control setting for your particular venting configuration. Do not reload the stove for long burns when the stainless secondary tubes or baffles are glowing red, or when the stove is uncomfortably hot to load. This indicates the stove is too hot to load for a long burn.

NOTE: DIAGRAMS & ILLUSTRATIONS ARE NOT TO SCALE.

OPTIONAL BLOWER KIT

The optional blower is controlled by a Dial-a-Temp *(see **Figure 24**)*. It contains an On/Off line switch with variable speed control from low to high.

1) Install the optional blower kit per the instructions provided in the blower kit.
2) Plug the blower power cord into the receptacle on the bottom of the Dial-A-Temp.
3) Plug the connected Dial-A-Temp into a properly grounded, 120 VAC wall outlet.
4) To operate, rotate the dial on the Dial-A-Temp clockwise until it clicks on. Rotate the dial further clockwise for a lower speed, then counter-clockwise for a higher speed.

NOTE: Turn blower off before opening the door to load the fuel.

⚠ WARNING

The blower must be plugged directly into a properly grounded three-prong receptacle, 120 VAC, 60 Hz, single phase. Do not cut or remove the grounding prong from this plug. Do not route power cord under or in front of appliance.

Installation must be in accordance with National Electrical Code, ANSI/NFPA 70 - latest edition. In Canada, the current CSA C22.1 Canadian Electrical Code - latest edition.

DANGER: Disconnect power before servicing blower.

OPTIONAL BLOWER KIT

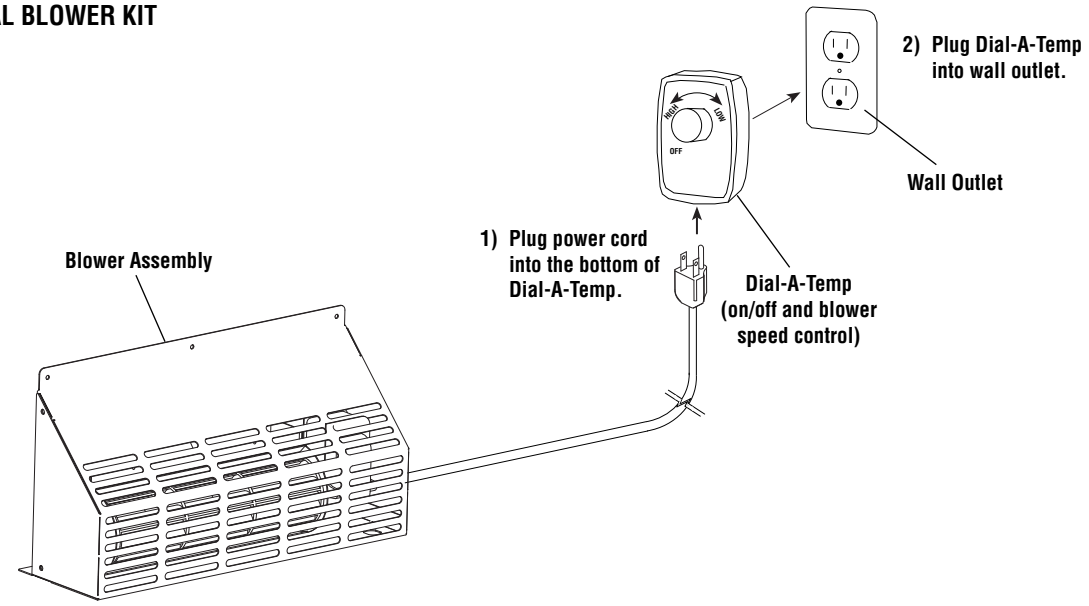


Figure 24

⚠ WARNING

In the event that you remove the blower for any reason, the rear heatshield must be returned to its original condition or replaced before using the heater. Excessive rear wall temperatures will result if the stove is burned with the blower opening unobstructed.

NOTE: DIAGRAMS & ILLUSTRATIONS ARE NOT TO SCALE.

DO'S AND DON'TS

DO NOT: Install or operate the appliance before reading this manual.

DO NOT: Close the draft beyond the point at which the flames are completely extinguished.

DO NOT: Open the appliance door without **fully opening** the draft first.

DO NOT: Burn driftwood or wood that has been in salt water. This includes some mill ends and scrap lumber that has been floated in salt water on the way to the mill. (This will void your warranty).

DO NOT: Force oversized logs into the firebox as this may dislodge the baffle assembly.

DO NOT: Close the door tightly during Burn-In Period.

DO: Consult local building department if other than recommended clearances are desired.

DO: Read instructions for the baffle boards occasionally to ensure you have not bumped or moved them out of place when loading wood.

DO: Check the chimney and baffle monthly to make sure they are clean.

DO: Burn seasoned, dry wood only! (RAIN = WET WOOD)

DO: Open the door frequently during Burn-In Period to keep gasket from adhering to the curing paint.

DO: Enjoy the warm feeling of your new IHP appliance.

Smoke Detector Recommended

Since there are always several potential sources of fire in any home, we recommend installing smoke detectors. If possible, install the smoke detector in a hallway adjacent to the room (to reduce the possibility of occasional false activation from the heat produced by these appliances). If your local code requires a smoke detector be installed within the same room, you must follow the requirements of your local code. Check with your local building department for requirements in your area.

Carbon Monoxide Monitor Recommended

Carbon Monoxide Poisoning: Early signs of carbon monoxide poisoning are similar to the flu with headaches, dizziness and/or nausea. If you have these signs, obtain fresh air immediately. Some people are more affected by carbon monoxide than others, including pregnant women, people with heart or lung disease or anemia, those under the influence of alcohol, and those at high altitudes.

It is against federal regulations to operate wood heaters in a manner inconsistent with operating instructions in the manual.

PROHIBITED FUELS

This heater is designed to burn natural wood only. Higher efficiencies and lower emissions generally result when burning air dried seasoned hardwoods, as compared to softwoods or to green or freshly cut hardwoods. DO NOT BURN:

- **Garbage;**
- **Lawn clippings or yard waste;**
- **Materials containing rubber, including tires;**
- **Materials containing plastic;**
- **Waste petroleum products, paints or paint thinners, or asphalt products;**
- **Materials containing asbestos;**
- **Construction or demolition debris;**
- **Railroad ties or pressure-treated wood;**
- **Manure or animal remains;**
- **Salt water driftwood or other previously salt water saturated materials;**
- **Unseasoned wood;**
- **Christmas tree branches;**
- **Paper products, colored paper, cardboard, plywood, or particleboard;**
- **gasoline;**
- **naphtha;**
- **engine oil;**
- **flammable liquids;**
- **solvents;**
- **grease; or**
- **coal**

The prohibition against burning these materials does not prohibit the use of fire starters made from paper, cardboard, saw dust, wax and similar substances for the purpose of starting a fire in an affected wood heater.

Burning these materials may result in release of toxic fumes or render the heater ineffective and cause smoke. Intense firing with these materials may overheat the fireplace, causing damage to the unit, a fire or even possibly igniting a chimney fire if the chimney is creosoted. Burning unapproved fuel, resulting in excessive pollutants being emitted, may be prohibited and subject to a fine or other penalty by the authority having jurisdiction in your area.

MAINTENANCE

Have your product inspected at least once a year by a qualified service technician to ensure gaskets, air tubes, baffles, and venting are in good repair to ensure proper performance. Have degraded items replaced by a qualified service technician.

THIS WOOD HEATER NEEDS PERIODIC INSPECTION AND REPAIR FOR PROPER OPERATION. IT IS AGAINST FEDERAL REGULATIONS TO OPERATE THIS WOOD HEATER IN A MANNER INCONSISTENT WITH OPERATING INSTRUCTIONS IN THIS MANUAL.

DOOR HINGES: If door hinges need lubricating, use an anti-seize compound (never use oil) available from your IHP dealer.

DOOR LATCH: Adjustment Instructions -

1. Using a 5/32" hex wrench, remove the side heat shield by removing 3 screws on the back, 2 screws on the bottom, and 1 screw at the top-front corner.
2. With the door open, loosen the latch nuts using a 3/8" wrench. Slide the latch assembly forward to loosen the door and backward to tighten the door.
3. Secure the nuts in place and test the door. If more adjustment is required, repeat step 2.
4. Replace the heat shield before burning the stove.

The hinge side of the door can also be adjusted if necessary. Repeat the procedure above on the hinge side of the stove.

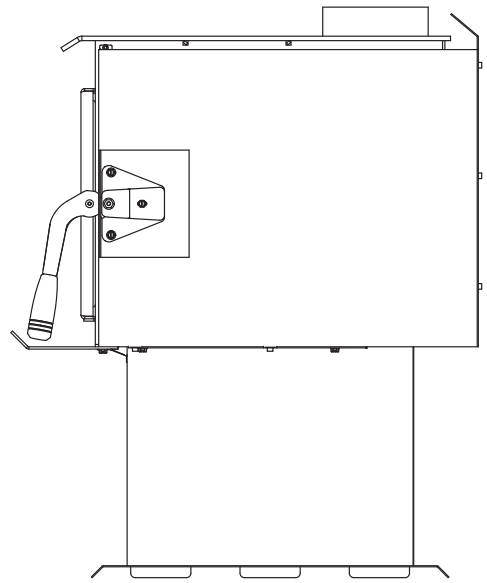


Figure 27

DOOR GASKET: Periodically check gasket to make sure it is not over-compressed. If compressed, replace with a special woven door rope. (Don't try substituting rope, only use IHP door rope).

BAFFLE BOARDS: Your baffle boards should be inspected during every chimney cleaning. If either board is damaged then replace baffle boards.

CREOSOTE FORMATION AND NEED FOR REMOVAL

When wood is burned slowly, it produces tar and other organic vapors, which combine with expelled moisture to form creosote. The creosote vapors condense in the relatively cool chimney flue of a slow-burning fire. As a result, creosote residue accumulates on the flue lining. When ignited, this creosote makes an extremely hot fire.

The chimney and chimney connector should be inspected at least once monthly during the heating season to determine if a creosote buildup has occurred. If creosote has accumulated (1/8" [3 mm] or more), it should be removed to reduce the risk of a chimney fire.

Establish a routine for the fuel, wood burner and firing technique. Check daily for creosote build-up until experience shows how often you need to clean to be safe. Be aware that the hotter the fire the less creosote is deposited, and weekly cleaning may be necessary in mild weather even though monthly cleaning may be enough in the coldest months. Contact your local municipal or provincial fire authority for information on how to handle a chimney fire. Have a clearly understood plan to handle a chimney fire.

DISPOSAL OF ASHES

Whenever ashes get 3 to 4 inches deep in your firebox, and when the fire has burned down and cooled, remove excess ashes. Leave an ash bed approximately 1 inch deep on the firebox bottom to help maintain a hot charcoal bed.

Ashes should be scooped out of a cool stove or fireplace insert with a small metal shovel. Ashes should be placed in a steel container with a tight fitting lid and moved outdoors immediately. Other waste shall not be placed in this container. The closed container of ashes should be placed on a non-combustible floor or on the ground, well away from all combustible materials, pending final disposal. If the ashes are disposed of by burial in soil or otherwise locally dispersed, they should be retained in the closed container until all the cinders have thoroughly cooled. Ashes can ignite up to 72 hours after removal from the appliance.

⚠ WARNING

Inspect and clean chimney and connector frequently. Under certain conditions of use, creosote buildup may occur rapidly.

MAINTENANCE

GLASS REPLACEMENT INSTRUCTIONS

*(Refer to **Figure 26**)*

Step 1. Remove Door Assembly - Remove the upper and lower hinge pins by pressing the bottom of each hinge pin up, then pull out from the top. Lift off door and place face down on a soft surface.

Step 2. Remove Glass Retainer Nuts (10 ea.) - Using an 3/8" nut driver or wrench remove the ten glass retainer nuts. To locate nuts, peel back the door gasket as necessary.

Step 3. Remove Glass - Carefully remove broken glass one piece at a time (protective leather gloves are recommended).

Step 4. Clean Door Frame - Clean the area of the door frame where the new glass with gasket will be installed.

Step 5. Install New Glass Assembly - Install the new glass with gasket (use only factory supplied 5mm ceramic glass with gasket. Do not substitute).

Step 6. Reinstall Retainer and Nuts - Carefully reinstall the glass retainer and nuts. Be very careful not to overtighten the nuts (this could result in glass breakage when the stove is hot).

Step 7. Reinstall Door - Align hinges on door frame with corresponding hinge holes on the face of stove. Reinstall the upper and lower hinge pins from the top.

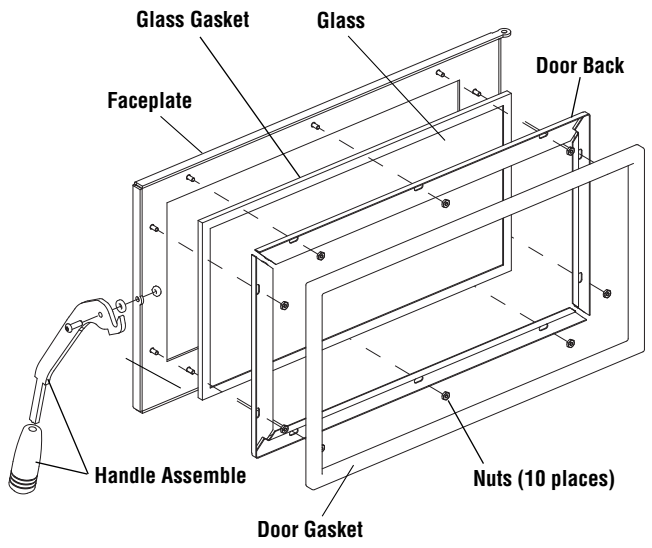


Figure 26 - Glass Replacement

GLASS CLEANING GUIDELINES

WARNING: DO NOT CLEAN GLASS WHEN APPLIANCE IS HOT!

Glass on any wood stove will not stay perfectly clean. Here are some guidelines for cleaning and caring for the glass:

- **Ensure the stove is cold prior to cleaning glass.**
- This appliance is designed to provide a flow of air over the inside of the glass, where along with high heat helps inhibit build-up on the glass. When build-up occurs, a commercial glass cleaner designed for stoves is recommended. Regular household glass cleaners will not clean creosote.
- Do not use abrasives such as steel pads, steel wool or oven cleaner as they will scratch the glass. Never scrape glass with a razor blade as this may pit the glass and make it impossible to clean in the future.
- Do not use chemical glass cleaners as they may damage the gaskets or painted surfaces.

TIPS FOR KEEPING THE GLASS CLEAN

- Burn only dry seasoned cord wood. **Wet wood = Dirty glass.**
- A short, hot fire (15 - 20 minutes) may help to clean off some of the normal buildup. **Lower burns = more build-up. Higher burns = less build-up.**
- Keep freshly loaded wood away from the glass.
- After reloading, allow all the wood to catch flame before dampering down the stove.

⚠ CAUTION

Cleaning Glass: Ensure appliance is cold prior to cleaning glass. A commercial glass cleaner designed for stoves is recommended. Do not use abrasive cleaners. Do not clean with any materials, which may scratch or otherwise damage the glass. Scratches on the glass can develop into cracks or break. Inspect the glass regularly. If you detect a crack, extinguish the fire and contact your dealer for a replacement.

NOTE: DIAGRAMS & ILLUSTRATIONS ARE NOT TO SCALE.

TROUBLESHOOTING

Problem	Solution
POOR DRAFT:	Extend chimney in length or have the chimney realigned to the proper size flue. Oversized chimneys normally have poor drafts. Remember, the appliances' draft depends solely on the natural draft of the chimney (See Draft Requirements on ***Page 4***). If your stove or fireplace insert is not drafting properly, your chimney is the problem. All stoves are thoroughly tested to ensure proper draft with the correct size chimney flue.
EXCESSIVE DRAFT:	With better chimneys being more common, excessive draft can be an issue. Alleviate excessive draft by slowing the burn rate of the appliance once it has reached proper operating temperature (See Maximizing Your Stoves Overall Efficiency on ***Page 18***).
DIRTY GLASS:	1) Burn smaller, hotter fires and check to make sure you are not setting the draft down too far with the draft control. 2) Make sure your wood is well-seasoned and dry (not open to rain - see Creosote and Fuel sections on ***Pages 17 and 22***). 3) See Poor Draft section (above) and Cleaning Glass on ***Pages 4 and 22***.
SMOKES WHEN DOOR IS OPEN:	1) If smoke is entering the room, check to make sure your baffle boards are properly installed. 2) Check the chimney for blockage due to creosote (see Chimney and Creosote sections on ***Page 22***). 3) Check draft (See POOR DRAFT section above).
WOOD BURNS TOO FAST:	1) The draft control must be closed further. 2) Add fuel at lower firebox temperatures. 3) Load wood side to side and reduce the flow of air under wood. 4) The door seal may need replacing, check for leakage. 5) See "Excessive Draft."
POOR HEAT OUTPUT:	1) Check your wood. Wet, moist, unseasoned wood will not produce heat. 2) Your stove or fireplace insert needs to be seasoned (moisture removed from the steel and brick). Continue to burn a fire. It normally takes from one to three weeks of burning to season your stove (See Burn-In Period on ***Page 15***). 3) See Excessive Draft section above.
PAINT GIVES OFF ODOR (smoke):	Paint is tempering-in. Burn only moderately hot for the first few days until paint is fully cured. Then burn a very hot fire to cure any paint that may not easily cure. Open windows or door to ventilate (See Burn-In Period on ***Page 15***).

REPLACEMENT PARTS - MODEL TAHOMA™ 2100GL

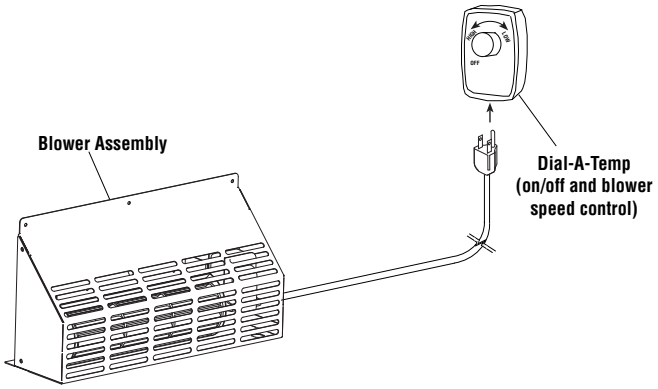
Contact an IHP dealer to obtain any of these parts. Never use substitute materials. Use of non-approved parts can result in poor performance and safety hazards.

Cat. No	Description
H8890	Right side heat shield
H8891	Left side heat shield
H8892	Back heat shield
F2629	Cast door assembly
H8894	Door channels w/nuts
H8895	Glass
H5640	Glass gasket kit (8’ 4”)
H5639	Door rope kit, 7/8” dia. (6’ 2”)
H8897	Baffles
H8898	Secondary burn tubes w/clamps
H5650	Draft rod knob
H8899	Ash lip w/hardware
H8900	Pedestal
H8901	Door handle w/hardware
H8902	Door latch w/hardware
H8896	Complete Firebrick kit

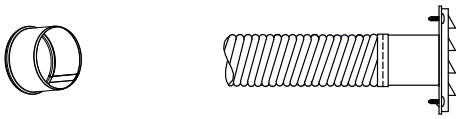
ACCESSORIES - MODEL TAHOMA™ 2100GL

OPTIONAL ACCESSORIES		
Cat. No.	Model	Description
BLOWER		
H8873	BLWR-ES-S-150	Blower Kit, Tahoma™ 2100GL
OUTSIDE AIR KIT		
UZIAD	UZIAD	Outside Air Coupler Kit (connects outside air ducting, UZI, to stove) AND -
UZI	UZI	Outside Air Ducting Kit (includes 4" insulated flex x 10' long) AND -
H8874	OUTAIRKIT-ES	Outside Air Panel and Air Channel Kit (includes rear pedestal panel and side and front air channels)
MISC.		
H8159	TSPK-B	Touch-Up Paint , Metallic Black, 12 oz. Aerosol

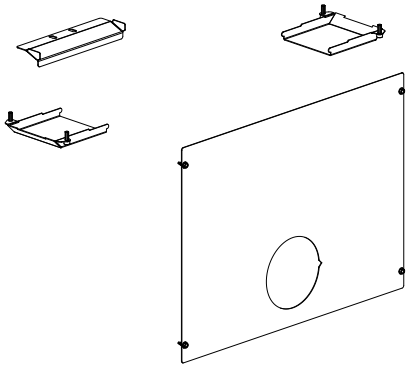
OPTIONAL BLOWER KIT



OUTSIDE AIR KITS



UZIAD UZI



H8874

TOUCH-UP PAINT



NOTE: DIAGRAMS & ILLUSTRATIONS ARE NOT TO SCALE.

SAFETY / LISTING LABEL

CONTACT LOCAL BUILDING OR FIRE OFFICIALS ABOUT RESTRICTIONS AND INSTALLATION INSPECTION IN YOUR AREA. ROOM HEATER, SOLID FUEL TYPE, ALSO FOR USE IN MOBILE HOMES PURSUANT TO (UM) 84-HUD.
COMMUNIQUEZ AVEC LES AUTORITÉS LOCALES EN BÂTIMENT OU LE SERVICE DE PRÉVENTION DES INCENDIES POUR CONNAÎTRE LES NORMES D'INSTALLATION ET D'INSPECTION DE VOTRE RÉGION. APPAREIL DE CHAUFFAGE CERTIFIÉ POUR COMBUSTIBLE SOLIDE PEUT-ÊTRE INSTALLÉ DANS UNE MAISON MOBILE SELON (UM) 84-HUD

IRONSTRIKE HEAT FOR LIFE

Report No./Numéro de Rapport	Model / Modèle	Serial No./Numéro de sérle:
14-193	Tahoma™ 2100GL	T2100GL-

Manufactured By / Fabriqué Par:
Innovative Hearth Products
1502 14th St NW
Auburn, WA 98001 USA

Tested to: UL 1482, ULC S627
Type Of Fuel: Solid Wood Only
Optional Blower, Part No. H8873, Model BLWR-ES-S-150
Blower Electrical Rating: 120V, 60 Hz, 1 Amp
Do not route power cord under or in front of appliance.
Replace glass only with 5mm ceramic.
Operate only with doors closed.
Do not obstruct the space beneath the heater.
This wood heater needs periodic inspection and repair for proper operation. Consult the owner's manual for further information. It is against federal regulations to operate this wood heater in a manner inconsistent with the operating instructions in the owner's manual.
Certification test emission value 1.55 grams/hr per 2020 cordwood standard

"PREVENT HOUSE FIRES"

Install and use only in accordance with manufacturer's installation and operating instructions and your local building codes.

CAUTION: Special methods are required when passing chimney through a wall or ceiling, refer to installation instructions and local building codes. Do not connect this unit to a chimney flue serving another appliance.

CAUTION: Moving Parts May Cause Injury. Do Not Operate Unit With Blower Cover Removed.

WARNING: Burning improper fuel (e.g. charcoal) can result in carbon monoxide poisoning, which may lead to death!

WARNING: (MOBILE HOME USA Only) An outside air inlet must be provided for combustion, and be unrestricted while unit is in use. Do not install appliance in a sleeping room. The structural integrity of the mobile home floor, walls and ceiling/roof must be maintained. Approval void when label is missing.

Tested to/Testé selon: UL 1482, ULC S627
Type de combustible: Bois seulement
Ventilateur Optionnel, No. De Pièces: H8873, Modèle BLWR-ES-S-150
Spécification Électrique Du Ventilateur: 120V, 60 Hz, 1 Amp
Ne pas faire passer le fil électrique sous ou en avant de l'appareil
Remplacez la vitre seulement avec la céramique de 5 millimètres.
Faire functionner uniquement lorsque les portes sont fermées.
Ne pas obstruer l'espace sous la bouche de chaleur.
Cet appareil de chauffage au bois doit être inspecté et entretenu périodiquement pour fonctionner correctement. Voir le manuel du propriétaire pour plus d'information. L'utilisation de cet appareil de chauffage au bois de manière incompatible avec les instructions du manuel du propriétaire constitue une infraction aux régulations fédérales.
Valeur d'émission du test d'homologation 1,55 g/h selon la norme 2020

"PREVENTION DES INCENDIES"

Installer et utiliser l'appareil en conformité avec les directives d'installation du fabricant et des autorités locales en bâtiment ou le service de prévention des incendies.

ATTENTION : Prenez des précautions spéciales lorsque vous faites passer une cheminée à travers un mur ou un plafond, référez-vous aux instructions d'installation et aux codes locaux de la construction. Ne pas brancher cette unité à un conduit de fumée raccordé à un autre appareil.

ATTENTION : Des pièces en mouvement peuvent causer des blessures. Ne pas opérer le ventilateur avec son protecteur retiré.

AVERTISSEMENT : La combustion d'un combustible inadapté (charbon) peut provoquer une intoxication au monoxyde de carbone et entraîner la mort !

AVERTISSEMENT : (MAISON MOBILE USA seulement) Une entrée d'air extérieure doit être installée et libre de toute restriction lors de l'utilisation de l'appareil. Ne pas installer l'appareil dans une chambre à coucher. L'intégrité structurale du plancher, des murs et du plafond/toit de la maison mobile doivent être maintenus.

CHIMNEY & CONNECTOR: Minimum 6" diameter, minimum 24 MSG black steel connector pipe with UL103HT listed factory-built chimney suitable for use with solid fuels or masonry chimney. Horizontal connection not tested, refer to local building codes for installation. Clearances to connector shall be measured from 6" flue collar. Restrictions apply! Read instructions before installing.

Mobile Home approved Class A - UL 103HT chimney and double wall connectors:

- Security
- Jakes Evans/GSW
- Dura-Vent
- Metal Fab
- Ameri-Tec
- Metalbestos
- IndustrialChimney

RESIDENTIAL chimney systems must be from the same brands as listed for mobile homes but connector pipe may be double wall or single wall.

Connector pipe and chimney must be of the same brand.

If optional blower is NOT used, Rear Heat Shield Block Off Plate shall be in place.

CHEMINÉE ET TUYAU CONNECTEUR : Approuvé pour raccordement avec un conduit de raccordement en acier noir 24 jauges minimum de 6" de diamètre et une cheminée préfabriquée certifiée pour combustible solide ou une cheminée de maçonnerie. Non certifié pour installation horizontale, référez-vous aux autorités locales en bâtiment. Des restrictions s'appliquent! Lisez les directives avant d'effectuer l'installation.

MAISON MOBILE (USA SEULEMENT) : cheminée certifiée Classe A – UL103HT et tuyaux connecteurs doubles parois :

- Security
- Jakes Evans/GSW
- Dura-Vent
- Metal Fab
- Ameri-Tec
- Metalbestos
- Industrial Chimney

RÉSIDENTIEL : Cheminée de la même marque de commerce que pour les maisons mobiles ci-dessus, mais le tuyau connecteur peut-être à double ou simple parois.

Le tuyau connecteur et la cheminée doivent être de la même marque de commerce.

Si l'option du ventilateur n'est pas utilisé, la plaque arrière coupe radiation doit être en place.

Made in U.S.A.
Fabriqué aux U.S.A.

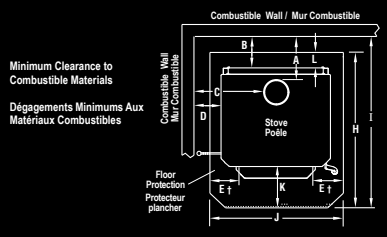
Date of Manufacture / Date De Fabrication

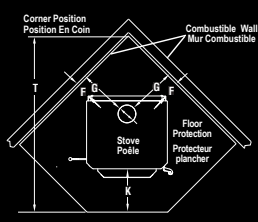
2019	2020	2021	JAN JANV	FEB FEVR	MAR MARS	APR AVR	MAY MAI	JUN JUIN	JUL JUIL	AUG AOÛT	SEP SEPT	OCT OCT	NOV NOV	DEC DEC

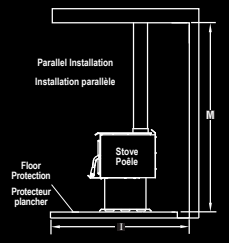
DO NOT REMOVE THIS LABEL
NE PAS ENLEVER OU RECOUVRIR CETTE ÉTIQUETTE

Part No./No. Pièce 900978-03 Rev. 0, 04/2019

U.S. ENVIRONMENTAL PROTECTION AGENCY
Certified to comply with 2020 cordwood standard.







USA inches (millimeters)	PIPE	INSTALLATION	A	B	C	D	E	F	G	H	I	J	K	L	M	T
	Single Wall / Simple Paroi	Residential / Résidentielle	14-1/4 (362)	11-1/2 (292)	23 (584)	13-3/8 (340)	8 (200)	9 (229)	18 (457)	37-5/8 (956)	49 (1245)	34-7/8 (886)	16 (406)	0 (0)	84 (2134)	61-1/2 (1562)
	Double Wall / Double Parois	Residential or Mobile Home / Résidentielle ou maisons mobiles	12 (305)	9-1/8 (232)	19-1/2 (495)	9-5/8 (245)	8 (200)	6 (152)	15 (381)	37-5/8 (956)	46-3/4 (1188)	34-7/8 (886)	16 (406)	0 (0)	84 (2134)	57-1/2 (1461)
Canada pounces (millimètres)	PIPE	INSTALLATION	A	B	C	D	E	F	G	H	I	J	K	L	M	T
	Single Wall / Simple Paroi	Residential / Résidentielle	14-1/4 (362)	11-1/2 (292)	23 (584)	13-3/8 (340)	8 (200)	9 (229)	18 (457)	47-5/8 (1210)	51 (1295)	40-7/8 (1038)	18 (450)	8 (200)	84 (2134)	63-1/2 (1613)
	Double Wall / Double Parois	Residential or Mobile Home / Résidentielle ou maisons mobiles	12 (305)	9-1/8 (232)	19-1/2 (495)	9-5/8 (245)	8 (200)	6 (152)	15 (381)	47-5/8 (1210)	48-3/4 (1238)	40-7/8 (1038)	18 (450)	8 (200)	84 (2134)	59-1/2 (1511)

† USA=8" (200mm) from door opening, Canada=8" (200mm) from sides and back of unit

FLOOR PROTECTOR: The hearth and/or floor protection must be a non-combustible hearth/floor protector with a minimum thickness of 3/8" (9.5mm), extending beneath the heater and to the front, sides, and rear as indicated.

SUITABLE FOR MOBILE-HOME INSTALLATION.

NOTICE: All mobile home installations require outside air kits (H8874).

Clearance dimensions are to flue collar.

† USA= 8" (200mm) à l'avant de la porte, Canada 8" de chaque côté de l'appareil.

PANNEAU PROTECTEUR PLANCHER : Les panneaux protecteurs doivent être non combustible, dont l'épaisseur minimale est de 3/8" (9.5mm) et doivent s'étendre sous l'appareil, à l'avant des portes, à l'arrière et de chaque côté tel qu'indiqué.

CONÇU POUR MAISONS MOBILES.

AVIS: USA SEULEMENT - Toutes les installations dans une maison mobile requièrent un ensemble de prise d'air extérieur (H8874).

Les distances de dégagement sont pour un conduit de 6".

CAUTION

HOT WHILE IN OPERATION. DO NOT TOUCH, KEEP CHILDREN, CLOTHING AND FURNITURE AWAY. CONTACT MAY CAUSE SKIN BURNS. SEE NAMEPLATE AND INSTRUCTIONS. DO NOT OVERFIRE. IF HEATER OR CHIMNEY CONNECTOR GLOWS, YOU ARE OVERFIRING. INSPECT AND CLEAN CHIMNEY AND CONNECTOR FREQUENTLY. UNDER CERTAIN CONDITIONS OF USE, CREOSOTE BUILDUP MAY OCCUR RAPIDLY. DO NOT USE GRATE OR ELEVATE FIRE - BUILD WOOD FIRE DIRECTLY ON HEARTH. FEED DOOR MUST BE CLOSED DURING FIRING EXCEPT WHEN ADDING FUEL. KEEP ASH DOOR CLOSED TO AVOID EXCESS HEAT. DANGER: RISK OF ELECTRICAL SHOCK. DISCONNECT POWER BEFORE SERVICING UNIT. FOR USE WITH SOLID WOOD FUEL ONLY.

ATTENTION

L'APPAREIL EST CHAUD LORS DE L'OPÉRATION. NE PAS Y TOUCHER. RISQUE DE BRÛLURES CUTANÉES. TENIR LES ENFANTS, LES MATÉRIAUX COMBUSTIBLES, LES VÊTEMENTS ET LES MEUBLES ELOIGNÉS DE L'APPAREIL. VOIR LA PLAQUE SIGNALÉTIQUE ET LES DIRECTIVES. NE PAS SURCHAUFFER L'APPAREIL. SI L'APPAREIL OU LE TUYAU DE CHEMINÉE ROUGIT, VOUS SURCHAUFFEZ. INSPECTER ET NETTOYER LA CHEMINÉE ET LE TUYAU CONNECTEUR FRÉQUEMMENT. SOUS CERTAINES CONDITIONS, IL SE PEUT QUE LE CRÉOSOTE S'ACCUMULE RAPIDEMENT. NE SURÉLEVER PAS LE FEU À L'AIDE D'UN CHENET. DÉPOSER LES BÛCHES DE BOIS DIRECTEMENT SUR L'ÂTRE. LA PORTE DOIT ÊTRE FERMÉE PENDANT L'USAGE SAUF POUR ALIMENTER LE FEU. GARDER LA PORTE "BY-PASS" (CENDRES) FERMÉE POUR ÉVITER DE SURCHAUFFER. DANGER: RISQUES DE DÉCHARGE ÉLECTRIQUE. DÉCONNECTER LE FIL ÉLECTRIQUE DE LA PRISE DE CONTACT AVANT LE SERVICE. NE PAS FAIRE PASSER LE FIL ÉLECTRIQUE SOUS OU EN AVANT DE L'APPAREIL. POUR USAGE AVEC LE BOIS SEULEMENT.

Innovative Hearth Products
IronStrike® Brand Wood Burning Stove and Insert
Limited Lifetime Warranty

THE WARRANTY
Innovative Hearth Products ("IHP") Limited Lifetime Warranty warrants your IronStrike® Brand Wood Burning Stove or Insert ("Product") to be free from defects in materials and workmanship at the time of manufacture. The Product body, firebox and ceramic glass carry the Limited Lifetime Warranty. Ceramic glass carries the Limited Lifetime Warranty against thermal breakage only. After installation, if covered components manufactured by IHP are found to be defective in materials or workmanship during the Limited Lifetime Warranty period and while the Product remains at the site of the original installation, IHP will, at its option, repair or replace the covered components. If repair or replacement is not commercially practical, IHP will, at its option, refund the purchase price or wholesale price of the IHP product, whichever is applicable. IHP will also pay IHP prevailing labor rates, as determined in its sole discretion, incurred in repairing or replacing such components for up to five years. THERE ARE EXCLUSIONS AND LIMITATIONS to this Limited Lifetime Warranty as described herein.

COVERAGE COMMENCEMENT DATE
Warranty coverage begins on the date of purchase. In the case of new home construction, warranty coverage begins on the date of first occupancy of the dwelling or six months after the sale of the Product by an independent IHP dealer/distributor, whichever occurs earlier. The warranty shall commence no later than 24 months following the date of product shipment from IHP, regardless of the installation or occupancy date.

EXCLUSIONS AND LIMITATIONS
This Limited Lifetime Warranty applies only if the Product is installed in the United States or Canada and only if operated and maintained in accordance with the printed instructions accompanying the Product and in compliance with all applicable installation and building codes and good trade practices.

This warranty is non-transferable and extends to the original owner only. The Product must be purchased through a listed supplier of IHP and proof of purchase must be provided. The Product body and firebox carry the Limited Lifetime Warranty from the date of installation. Vent components, trim components and paint are excluded from this Limited Lifetime Warranty. The following do not carry a Limited Lifetime Warranty but are warranted as follows:

Cast Iron Heat Exchanger – Replacement for five years from the date of installation
Cast iron parts – Replacement for one year from the date of installation
Catalyst – Carries a separate warranty. Refer to the warranty certificate provided for that part
Electrical components – Repair or replacement for one year from date of installation
Gaskets – Replacement for one year from the date of installation.
Gold & nickel plating – Replacement for two years from date of installation. Excludes tarnishing
Refractory & screens – Replacement for two years from date of installation. Excludes hairline cracks
Removable air tubes – Repair or replacement for seven years from date of installation. IHP prevailing labor rates for years one through five.
Labor coverage – Prevailing IHP labor rates apply for the warranty period of the component, unless otherwise noted

Parts not otherwise listed carry a 90 day warranty from the date of installation.

Whenever practicable, IHP will provide replacement parts, if available, for a period of 10 years from the last date of manufacture of the Product.

IHP will not be responsible for: (a) damages caused by normal wear and tear, accident, riot, fire, flood or acts of God; (b) damages caused by abuse, negligence, misuse, or unauthorized alteration or repair of the Product affecting its stability or performance. (The Product must be subject to normal use with approved fuels listed in the Operation Manual provided with the product. Fuel products with abnormal burning characteristics, including but not limited to fuel such as driftwood, coal or plywood and wood products using a binder may burn at excessive temperatures and may cause damage to the Product or may cause it to function improperly; IHP stoves, inserts and high efficiency EPA fireplaces are approved for burning dry seasoned wood only.); (c) damages caused by failing to provide proper maintenance and service in accordance with the instructions provided with the Product; (d) damages, repairs or inefficiency resulting from faulty installation or application of the Product.

Coverage of this Limited Lifetime Warranty is conditional upon the appliance being operated without the use of grates, irons or any other method to elevate the fire.

IHP is not responsible for inadequate system draft caused by air conditioning and heating systems, mechanical ventilation systems, or general construction conditions which may generate negative air pressure in the room in which the appliance is installed. Additionally IHP assumes no responsibility for smoking conditions caused by inadequate chimney height, adjoining trees or buildings, adverse wind conditions or unusual environmental factors and conditions. Certain IHP Products are listed for use with Security Chimneys International, Ltd. chimney systems only. Use of chimney components other than that specified in the Product manual will void the Product warranty.

This Limited Lifetime Warranty covers only parts and labor as provided herein. In no case shall IHP be responsible for materials, components or construction which are not manufactured or supplied by IHP or for the labor necessary to install, repair or remove such materials, components or construction. Additional utility bills incurred due to any malfunction or defect in equipment are not covered by this Limited Lifetime Warranty. All replacement or repair components will be shipped F.O.B. from the nearest stocking IHP factory.

LIMITATION ON LIABILITY
It is expressly agreed and understood that IHP's sole obligation and the purchaser's exclusive remedy under this warranty, under any other warranty, expressed or implied, or in contract, tort or otherwise, shall be limited to replacement, repair, or refund, as specified herein.

In no event shall IHP be liable for any incidental or consequential damages caused by defects in the Product, whether such damage occurs or is discovered before or after replacement or repair, and whether such damage is caused by IHP's negligence. IHP has not made and does not make any representation or warranty of fitness for a particular use or purpose, and there is no implied condition of fitness for a particular use or purpose.

IHP makes no expressed warranties except as stated in this Limited Lifetime Warranty. The duration of any implied warranty is limited to the duration of this expressed warranty.

No one is authorized to change this Limited Lifetime Warranty or to create for IHP any other obligation or liability in connection with the Product. Some states and provinces do not allow the exclusion or limitation of incidental or consequential damages, so the above limitations or exclusions may not apply to you. The provisions of this Limited Lifetime Warranty are in addition to and not a modification of or subtraction from any statutory warranties and other rights and remedies provided by law.

INVESTIGATION OF CLAIMS AGAINST WARRANTY
IHP reserves the right to investigate any and all claims against this Limited Lifetime Warranty and to decide, in its sole discretion, upon the method of settlement.

To receive the benefits and advantages described in this Limited Lifetime Warranty, the appliance must be installed and repaired by a licensed contractor approved by IHP.

Contact IHP at the address provided herein to obtain a listing of approved dealers/distributors. **IHP shall in no event be responsible for any warranty work done by a contractor that is not approved without first obtaining IHP's prior written consent.**

HOW TO REGISTER A CLAIM AGAINST WARRANTY
In order for any claim under this warranty to be valid, you must contact the IHP dealer/distributor from which you purchased the product. If you cannot locate the dealer/distributor, then you must notify IHP in writing. IHP must be notified of the claimed defect in writing within 90 days of the date of failure. Notices should be directed to the IHP Warranty Department at 1769 East Lawrence Street; Russellville, AL 35654 or visit our website at WWW.IRONSTRIKE.US.COM.

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P/N 900205-00, Rev. B 02/2018

Innovative Hearth Products
1769 East Lawrence Street • Russellville, AL 35654

WARRANTY

Your wood appliance is covered by a limited warranty (provided with the appliance). Please read the warranty to be familiar with its coverage.

Retain this manual. File it with your other documents for future reference.

REPLACEMENT PARTS

See ***Page 24*** for a complete replacement parts list. Use only parts supplied from the manufacturer.

Normally, all parts should be ordered through your IHP distributor or dealer. Parts will be shipped at prevailing prices at time of order.

When ordering repair parts, always give the following information:

1. The model number of the appliance.
2. The Serial Number of the appliance.
3. The part number.
4. The description of the part.
5. The quantity required.
6. The installation date of the appliance.

If you encounter any problems or have any questions concerning the installation or application of this system, please contact your dealer.

Innovative Hearth Products
1769 East Lawrence Street
Russellville, AL 35654
IronStrike.us.com

PRODUCT REFERENCE INFORMATION

We recommend that you record the following important information about your appliance. If you did not purchase your appliance directly from an IHP dealer, then contact us at IronStrike.us.com to find your nearest IHP dealer who will answer your questions or address your concerns.

Model Number _____

Serial Number _____

Date Installed _____

Your Dealer's Name _____

NATIONAL FIREPLACE INSTITUTE NFI CERTIFIED www.nficertified.org

We recommend that our woodburning hearth products be installed and serviced by professionals who are certified in the U.S. by the National Fireplace Institute® (NFI) as NFI Woodburning Specialists or who are certified in Canada by Wood Energy Technical Training (WETT).

Wood Energy Technical Training www.wettinc.ca

Innovative Hearth Products (IHP) reserves the right to make changes at any time, without notice, in design, materials, specifications, and prices, and also to discontinue colors, styles, and products. Consult your local distributor for fireplace code information.

INNOVATIVE HEARTH PRODUCTS

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P900978-00

CONTACT LOCAL BUILDING OR FIRE OFFICIALS ABOUT RESTRICTIONS AND INSTALLATION INSPECTION IN YOUR AREA. ROOM HEATER, SOLID FUEL TYPE, ALSO FOR USE IN MOBILE HOMES PURSUANT TO (UM) 84-HUD.
COMMUNIQUEZ AVEC LES AUTORITÉS LOCALES EN BÂTIMENT OU LE SERVICE DE PRÉVENTION DES INCENDIES POUR CONNAÎTRE LES NORMES D'INSTALLATION ET D'INSPECTION DE VOTRE RÉGION. APPAREIL DE CHAUFFAGE CERTIFIÉ POUR COMBUSTIBLE SOLIDE PEUT-ÊTRE INSTALLÉ DANS UNE MAISON MOBILE SELON (UM) 84-HUD

Report No./Numéro de Rapport	Model / Modèle	Serial No./Numéro de sérle:
14-193	WXS2021WS-B	WXS2021WS-B-

Manufactured By / Fabriqué Par:
Innovative Hearth Products
1502 14th St NW
Auburn, WA 98001 USA

Tested to: UL 1482, ULC S627
Type Of Fuel: Solid Wood Only
Optional Blower, Part No. H8873, Model BLWR-ES-S-150
Blower Electrical Rating: 120V, 60 Hz, 1 Amp
Do not route power cord under or in front of appliance.
Replace glass only with 5mm ceramic.
Operate only with doors closed.
Do not obstruct the space beneath the heater.
This wood heater needs periodic inspection and repair for proper operation. Consult the owner's manual for further information. It is against federal regulations to operate this wood heater in a manner inconsistent with the operating instructions in the owner's manual.
Certification test emission value 1.55 grams/hr per 2020 cordwood standard

Tested to/Testé selon: UL 1482, ULC S627
Type de combustible: Bois seulement
Ventilateur Optionnel, No. De Pièces: H8873, Modèle BLWR-ES-S-150
Spécification Électrique Du Ventilateur: 120V, 60 Hz, 1 Amp
Ne pas faire passer le fil électrique sous ou en avant de l'appareil
Remplacez la vitre seulement avec la céramique de 5 millimètres.
Faire functionner uniquement lorsque les portes sont fermées.
Ne pas obstruer l'espace sous la bouche de chaleur.
Cet appareil de chauffage au bois doit être inspecté et entretenu périodiquement pour fonctionner correctement. Voir le manuel du propriétaire pour plus d'information. L'utilisation de cet appareil de chauffage au bois de manière incompatible avec les instructions du manuel du propriétaire constitue une infraction aux régulations fédérales.
Valeur d'émission du test d'homologation 1,55 g/h selon la norme 2020

"PREVENT HOUSE FIRES"

Install and use only in accordance with manufacturer's installation and operating instructions and your local building codes.

CAUTION: Special methods are required when passing chimney through a wall or ceiling, refer to installation instructions and local building codes. Do not connect this unit to a chimney flue serving another appliance.

CAUTION: Moving Parts May Cause Injury. Do Not Operate Unit With Blower Cover Removed.

WARNING: Burning improper fuel (e.g. charcoal) can result in carbon monoxide poisoning, which may lead to death!

WARNING: (MOBILE HOME USA Only) An outside air inlet must be provided for combustion, and be unrestricted while unit is in use. Do not install appliance in a sleeping room. The structural integrity of the mobile home floor, walls and ceiling/roof must be maintained. Approval void when label is missing.

"PREVENTION DES INCENDIES"

Installer et utiliser l'appareil en conformité avec les directives d'installation du fabricant et des autorités locales en bâtiment ou le service de prévention des incendies.

ATTENTION : Prenez des précautions spéciales lorsque vous faites passer une cheminée à travers un mur ou un plafond, référez-vous aux instructions d'installation et aux codes locaux de la construction. Ne pas brancher cette unité à un conduit de fumée raccordé à un autre appareil.

ATTENTION : Des pièces en mouvement peuvent causer des blessures. Ne pas opérer le ventilateur avec son protecteur retiré.

AVERTISSEMENT : La combustion d'un combustible inadapté (charbon) peut provoquer une intoxication au monoxyde de carbone et entraîner la mort !

AVERTISSEMENT : (MAISON MOBILE USA seulement) Une entrée d'air extérieure doit être installée et libre de toute restriction lors de l'utilisation de l'appareil. Ne pas installer l'appareil dans une chambre à coucher. L'intégrité structurale du plancher, des murs et du plafond/toit de la maison mobile doivent être maintenus.

CHIMNEY & CONNECTOR: Minimum 6" diameter, minimum 24 MSG black steel connector pipe with UL103HT listed factory-built chimney suitable for use with solid fuels or masonry chimney. Horizontal connection not tested, refer to local building codes for installation. Clearances to connector shall be measured from 6" flue collar. Restrictions apply! Read instructions before installing.

Mobile Home approved Class A - UL 103HT chimney and double wall connectors:
• Security • Jakes Evans/GSW • Dura-Vent
• Metal Fab • Ameri-Tec • Metalbestos • IndustrialChimney

RESIDENTIAL chimney systems must be from the same brands as listed for mobile homes but connector pipe may be double wall or single wall.

Connector pipe and chimney must be of the same brand.

If optional blower is NOT used, Rear Heat Shield Block Off Plate shall be in place.

CHEMINÉE ET TUYAU CONNECTEUR : Approuvé pour raccordement avec un conduit de raccordement en acier noir 24 jauges minimum de 6" de diamètre et une cheminée préfabriquée certifiée pour combustible solide ou une cheminée de maçonnerie. Non certifié pour installation horizontale, référez-vous aux autorités locales en bâtiment. Des restrictions s'appliquent! Lisez les directives avant d'effectuer l'installation.

MAISON MOBILE (USA SEULEMENT) : cheminée certifiée Classe A – UL103HT et tuyaux connecteurs doubles parois :
• Security • Jakes Evans/GSW • Dura-Vent
• Metal Fab • Ameri-Tec • Metalbestos • Industrial Chimney

RÉSIDENTIEL: Cheminée de la même marque de commerce que pour les maisons mobiles ci-dessus, mais le tuyau connecteur peut-être à double ou simple parois.

Le tuyau connecteur et la cheminée doivent être de la même marque de commerce.

Si l'option du ventilateur n'est pas utilisé, la plaque arrière coupe radiation doit être en place.

Made in U.S.A.
Fabriqué aux U.S.A.

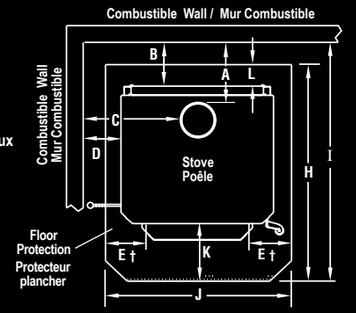
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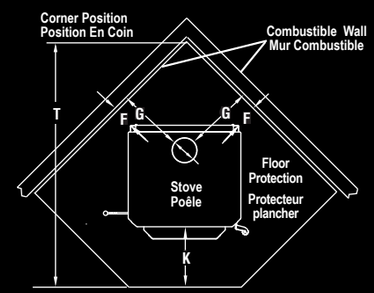
Date of Manufacture / Date De Fabrication

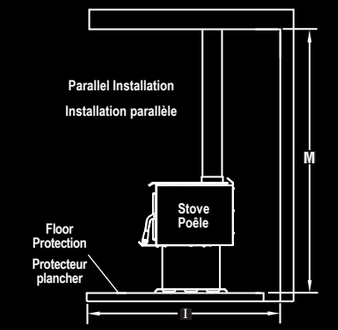
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U.S. ENVIRONMENTAL PROTECTION AGENCY
Certified to comply with 2020 cordwood standard.

Part No./No. Pièce 900979-03 Rev. 0, 04/2019







USA inches (millimeters)

PIPE	INSTALLATION	A	B	C	D	E	F	G	H	I	J	K	L	M	T
Single Wall / Simple Paroi	Residential / Résidentielle	14-1/4 (362)	11-1/2 (292)	23 (584)	13-3/8 (340)	8 (200)	9 (229)	18 (457)	37-5/8 (956)	49 (1245)	34-7/8 (886)	16 (406)	0 (0)	84 (2134)	61-1/2 (1562)
Double Wall / Double Parois	Residential or Mobile Home / Résidentielle ou maisons mobiles	12 (305)	9-1/8 (232)	19-1/2 (495)	9-5/8 (245)	8 (200)	6 (152)	15 (381)	37-5/8 (956)	46-3/4 (1188)	34-7/8 (886)	16 (406)	0 (0)	84 (2134)	57-1/2 (1461)

Canada pounces (millimètres)

PIPE	INSTALLATION	A	B	C	D	E	F	G	H	I	J	K	L	M	T
Single Wall / Simple Paroi	Residential / Résidentielle	14-1/4 (362)	11-1/2 (292)	23 (584)	13-3/8 (340)	8 (200)	9 (229)	18 (457)	47-5/8 (1210)	51 (1295)	40-7/8 (1038)	18 (450)	8 (200)	84 (2134)	63-1/2 (1613)
Double Wall / Double Parois	Residential or Mobile Home / Résidentielle ou maisons mobiles	12 (305)	9-1/8 (232)	19-1/2 (495)	9-5/8 (245)	8 (200)	6 (152)	15 (381)	47-5/8 (1210)	48-3/4 (1238)	40-7/8 (1038)	18 (450)	8 (200)	84 (2134)	59-1/2 (1511)

† USA=8" (200mm) from door opening, Canada=8" (200mm) from sides and back of unit

FLOOR PROTECTOR: The hearth and/or floor protection must be a non-combustible hearth/floor protector with a minimum thickness of 3/8" (9.5mm), extending beneath the heater and to the front, sides, and rear as indicated.

SUITABLE FOR MOBILE-HOME INSTALLATION.

NOTICE: All mobile home installations require outside air kits (H8874).

Clearance dimensions are to flue collar.

† USA= 8" (200mm) à l'avant de la porte, Canada 8" de chaque côté de l'appareil.

PANNEAU PROTECTEUR PLANCHER : Les panneaux protecteurs doivent être non combustible, dont l'épaisseur minimale est de 3/8" (9.5mm) et doivent s'étendre sous l'appareil, à l'avant des portes, à l'arrière et de chaque côté tel qu'indiqué.

CONÇU POUR MAISONS MOBILES.

AVIS: USA SEULEMENT - Toutes les installations dans une maison mobile requièrent un ensemble de prise d'air extérieur (H8874).

Les distances de dégagement sont pour un conduit de 6".

CAUTION

HOT WHILE IN OPERATION. DO NOT TOUCH, KEEP CHILDREN, CLOTHING AND FURNITURE AWAY. CONTACT MAY CAUSE SKIN BURNS. SEE NAMEPLATE AND INSTRUCTIONS. DO NOT OVERFIRE. IF HEATER OR CHIMNEY CONNECTOR GLOWS, YOU ARE OVERFIRING. INSPECT AND CLEAN CHIMNEY AND CONNECTOR FREQUENTLY. UNDER CERTAIN CONDITIONS OF USE, CREOSOTE BUILDUP MAY OCCUR RAPIDLY. DO NOT USE GRATE OR ELEVATE FIRE - BUILD WOOD FIRE DIRECTLY ON HEARTH. FEED DOOR MUST BE CLOSED DURING FIRING EXCEPT WHEN ADDING FUEL. KEEP ASH DOOR CLOSED TO AVOID EXCESS HEAT. DANGER: RISK OF ELECTRICAL SHOCK. DISCONNECT POWER BEFORE SERVICING UNIT. FOR USE WITH SOLID WOOD FUEL ONLY.

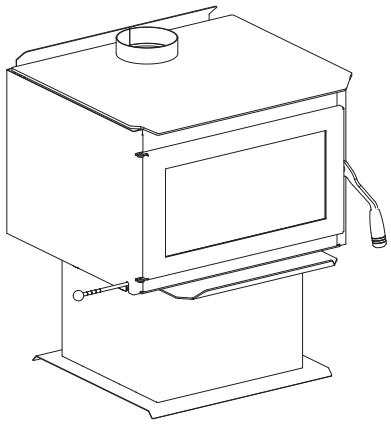
ATTENTION

L'APPAREIL EST CHAUD LORS DE L'OPÉRATION. NE PAS Y TOUCHER. RISQUE DE BRÛLURES CUTANÉES. TENIR LES ENFANTS, LES MATÉRIAUX COMBUSTIBLES, LES VÊTEMENTS ET LES MEUBLES ELOIGNÉS DE L'APPAREIL. VOIR LA PLAQUE SIGNALÉTIQUE ET LES DIRECTIVES. NE PAS SURCHAUFFER L'APPAREIL. SI L'APPAREIL OU LE TUYAU DE CHEMINÉE ROUGIT, VOUS SURCHAUFFEZ. INSPECTER ET NETTOYER LA CHEMINÉE ET LE TUYAU CONNECTEUR FRÉQUEMMENT. SOUS CERTAINES CONDITIONS, IL SE PEUT QUE LE CRÉOSOTE S'ACCUMULE RAPIDEMENT. NE SURÉLEVER PAS LE FEU À L'AIDE D'UN CHENET. DÉPOSER LES BÛCHES DE BOIS DIRECTEMENT SUR L'ÂTRE. LA PORTE DOIT ÊTRE FERMÉE PENDANT L'USAGE SAUF POUR ALIMENTER LE FEU. GARDER LA PORTE "BY-PASS" (CENDRES) FERMÉE POUR ÉVITER DE SURCHAUFFER. DANGER: RISQUES DE DÉCHARGE ÉLECTRIQUE. DÉCONNECTER LE FIL ÉLECTRIQUE DE LA PRISE DE CONTACT AVANT LE SERVICE. NE PAS FAIRE PASSER LE FIL ÉLECTRIQUE SOUS OU EN AVANT DE L'APPAREIL. POUR USAGE AVEC LE BOIS SEULEMENT.

INSTALLATION AND OPERATION MANUAL

Free-Standing
EPA Certified
Wood-Burning Stoves

Save These Instructions
For Future Reference



P/N 900979-00, Rev. NC, 05/2019

P900979-00

Wood-Burning Stove
Model WXS2021WS-B

PFS C US

Report # 14-193

NATIONAL FIREPLACE INSTITUTE NFI CERTIFIED
www.nficertified.org

We recommend that our woodburning hearth products be installed and serviced by professionals who are certified in the U.S. by the National Fireplace Institute® (NFI) as NFI Woodburning Specialists or who are certified in Canada by Wood Energy Technical Training (WETT).

Wood Energy Technical Training

A French manual is available upon request. Order P/N 900979-01.

Ce manuel d'installation est disponible en francais, simplement en faire la demande. Numéro de la pièce 900979-01.

This appliance must be properly installed and operated in order to prevent the possibility of a house fire. Please read this entire installation and operation manual before installing and using your wood stove. Failure to follow these instructions could result in property damage, bodily injury or even death. Contact your local building or fire officials to obtain a permit and information on any installation requirements and inspection requirements in your area.

⚠ WARNING

- **Hot! Do not touch! The glass and surfaces of this appliance will be hot during operation and will retain heat for a while after shutting off the appliance. Severe burns may result.**
- **Carefully supervise children in the same room as appliance.**

Agency Copy

CONGRATULATIONS!

When you purchased your new wood stove, you joined the ranks of thousands of individuals whose answer to their home heating needs reflects their concern for aesthetics, efficiency and our environment. We extend our continued support to help you achieve the maximum benefit and enjoyment available from your new wood stove.

Thank you for selecting an Innovative Hearth Products (IHP) Stove as the answer to your home supplemental heating needs.

TABLE OF CONTENTS

Using This Manual 2
Important Safety Information 3
Testing Information 4
Draft Requirements 4
Selecting the Proper Venting System 4
Negative Pressure Warning 5
Clearances to Combustibles 6-7
Floor Protection 6
Chimney and Connector 6
Components 6
Installation Clearances 7
Specifications 8
Typical Installation Figures 9
Chimney Installation 10
Manufactured (mobile) Home Installations 10
Chimney - Wall Pass-Through Requirements 11
Outside Combustion Air Kit Installation 12
Brick Installation 13
Post Installation Checks 14
Paint Curing 15
Burn-In Period 15
Operating Hints 15
Door Operation 15
Starting and Maintaining a Fire 16
Fuel 17
Getting the Most Out of Your Stove 18
Maximizing Your Stove's Overall Efficiency 18
Achieving Clean, Long Burns 18
Optional Blower Kit 19
Do's and Don'ts 20
Smoke Detector Recommended 20
Carbon Monoxide Monitor Recommended 20
Maintenance 21-22
Troubleshooting 23
Replacement Parts Lists 24
Accessories 25
Safety / Listing Label 26
Warranty 27
Product Reference Information 28

USING THIS MANUAL

Please read and carefully follow all of the instructions found in this manual. Please pay special attention to the safety instructions provided in this manual.

PRODUCT IS SUBJECT TO CHANGE WITHOUT NOTICE

IMPORTANT SAFETY AND WARNING INFORMATION

READ THIS MANUAL IN ITS ENTIRETY AND UNDERSTAND THESE RULES TO FOLLOW FOR SAFETY.

1. When this room heater is not properly installed, a house fire may result. To reduce the risk of fire, follow the installation instructions. Contact local building or fire officials about restrictions and installation inspection requirements in your area.
2. Wear gloves during installation to avoid injury from sharp edges on the stove and/or its parts.
3. This unit is designed and engineered to burn only dry, well-seasoned wood. Burning wet wood will greatly reduce the stove's efficiency, produce excessive amounts of smoke and can cause dangerous chimney fires due to creosote build-up.
4. Before opening the door, the draft control must be fully open to avoid possible combustion flash (ignition of hot volatile gases as the door is opened).
5. Never use gasoline, gasoline-type lantern fuel, kerosene, charcoal lighter fluid, or similar liquids to start or 'freshenup' a fire in this heater. Keep all such liquids well away from the heater while it is in use. DO NOT USE CHEMICALS OR FLUIDS TO START THE FIRE.
6. While burning, fuel utilizes oxygen from the air in the room. Be sure to allow an adequate amount of fresh air into the room where the stove is burning.
7. The outside surface of the stove will be hot while burning properly and can set items like clothing and curtains on fire. Keep furnishings and other combustible materials away from the stove. Using the heat from the stove to dry wet clothing can be hazardous if clothes are placed too near the surface of the stove.
8. HOT WHILE IN OPERATION. KEEP CHILDREN, CLOTHING FURNISHINGS AND COMBUSTIBLE MATERIAL A CONSIDERABLE DISTANCE AWAY. CONTACT MAY CAUSE SKIN BURNS. Do not allow children to play near the stove without close supervision. Do not touch the stove while it is burning. Use extreme caution while the unit is in use. Surface temperatures become dangerously hot and can cause serious burns.
9. Do not allow anyone to operate the stove who is not familiar with the operating instructions.
10. Attempts to achieve heat output rates that exceed stove design specifications can result in permanent damage to the stove. Never leave your stove unattended on high burn rates. This may cause overfiring. Overfiring the stove may cause a house fire. If the stove glows, you are overfiring.
11. Keep a water hose or hand-operated fire extinguisher close for safety.
12. Smoke Detectors - Since there are always several potential sources of fire in any home, we recommend installing smoke detectors. If possible, install the smoke detector in a hallway adjacent to the room (to reduce the possibility of occasional false activation from the heat produced by the stove). If your local code requires a smoke detector be installed within the same room, you must follow the requirements of your local code. Check with your local building department for requirements in your area.
13. Inspect your chimney at least once a month during the burning season to check for soot and creosote accumulations. Any accumulations over 1/8" thick should be removed by a professional chimney sweep. Do not attempt to burn out heavy creosote accumulations with a hot fire. If large accumulations are occurring, review your burning procedures.
14. If a creosote fire should develop, the fire department should be called immediately and then attempts should be made to control the fire until assistance arrives. If a "runaway" fire should develop causing over-heating of the stove, the door and draft regulators should be closed immediately. The fire should die down once deprived of oxygen. After a severe chimney fire, the complete chimney system should be checked before further use.
15. Do Not Use Grate Or Elevate Fire - Build Wood Fire Directly On Hearth (firebrick). Do not use andirons or other methods of supporting the fuel.
16. Please read this entire manual before you install and use your new room heater. Failure to follow instructions may result in property damage, bodily injury, or even death.
17. Check all local building and safety codes before installation. The installation instructions and appropriate code requirements must be followed exactly and without compromise. In the absence of local codes the following standards and codes must be followed.
18. In the U.S.A, install in accordance with the National Fire Protection Association's Code, NFPA 211, Standards for Chimneys, Fireplaces, Vents and Solid-Fuel-Burning Appliances, or similar regulations, may apply to the installation of a Solid-Fuel-Burning appliance in your area. In Canada, the guideline is established by the CSA Standard, CAN/CSA-B365-M93, Installation Code for Solid-Fuel-Burning Appliances and Equipment.
19. DO NOT CONNECT TO OR USE IN CONJUNCTION WITH ANY AIR DISTRIBUTION DUCTWORK UNLESS SPECIFICALLY APPROVED FOR SUCH INSTALLATIONS.
20. WARNING: BURNING IMPROPER FUEL (I.E. CHARCOAL) CAN RESULT IN CARBON MONOXIDE POISONING, WHICH MAY LEAD TO DEATH!
21. Carbon Monoxide Poisoning – Early signs of carbon monoxide poisoning resemble the flu with headaches, dizziness, or nausea. If you have these signs, get fresh air at once! Have the heater inspected by a qualified service technician. Some people are more affected by carbon monoxide than others. These include pregnant women, people with heart or lung disease or anemia, those under the influence of alcohol, and those at high altitudes.
22. Failure to use manufacturer provided parts, variations in techniques and construction materials or practices other than those described in this manual may create a fire hazard and void the limited warranty.
23. Do not make any make-shift compromises during installation. Any modification or alteration may result in damage to the appliance or dwelling and will void the warranty, certification and listings of this unit.
24. These appliances are designed as supplemental heaters. Therefore, it is advisable to have an alternate heat source when installed in a dwelling.

25. **Do Not Overfire – If Heater or Chimney Connector Glows, You Are Overfiring.**
26. **DO NOT CONNECT THIS UNIT TO A CHIMNEY FLUE SERVING ANOTHER APPLIANCE.**
27. **DO NOT BURN GARBAGE OR FLAMMABLE FLUIDS SUCH AS GASOLINE, NAPHTHA OR ENGINE OIL.**
28. **This wood heater has a manufacturer-set minimum low burn rate that must not be altered. It is against federal regulations to alter this setting or otherwise operate this wood heater in a manner inconsistent with operating instructions in this manual.**

⚠ WARNING

This product can expose you to chemicals including Carbon Black, which is known to the State of California to cause cancer, and Carbon Monoxide, which is known to the State of California to cause birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov

TESTING INFORMATION

This manual describes the installation and operation of these non-catalytic wood heaters. These heaters meet the U.S. Environmental Protection Agency's emissions limits, and are compliant with 2020 EPA NSPS particulate emission standards. This heater has been developed, tested and constructed in accordance with the requirements of UL 1482, ULC S627 and HUD standards and is listed by PFS Corporation. These heaters have been approved for residential and mobile home installations.

Model	Emission Rate	BTU/hr Output Range	Max. Output BTU/hr	Tested Average Efficiency
WXS2021WS-B	1.55 g/hr	10,491 - 30,387	76,000	71.0%

DRAFT REQUIREMENTS

This appliance is dependent upon a properly functioning chimney for optimum performance. It is a high efficiency appliance that loses much less heat up the chimney than older appliances and fireplaces. For this reason it is important to match the stove to the chimney. The chimney has two functions:

1. It draws combustion air into the appliance (without air, no fuel will burn) and
2. It exhausts combustion by-products. Your new appliance is what is known as a "natural draft" appliance.

The appliance depends solely on the natural draft of the chimney system to draw combustion air into the unit. Draft is the force that moves air from the appliance up into the chimney. The amount of draft in your chimney depends on the length of the chimney, local geography, nearby obstructions and other factors. Too much draft may cause excessive temperatures in the appliance (overfiring). Slow or inadequate draft equals poor combustion and possible smoking problems.

The following are some conditions that may contribute to poor chimney draft:

1. A chimney too large for your appliance.
2. A chimney with not enough height to produce adequate draft.
3. A chimney with excessive height (this may allow exhaust to cool too much before exiting, which will stall the rate the exhaust exits).
4. Offsets in the venting system are too restrictive (see *Chimney Guidelines)*.

Inadequate draft will cause the appliance to leak smoke into the room through the stove and the chimney connector joints.

Excessive draft may cause an uncontrollable burn or a glowing red stove or chimney part.

Overfiring Damage - If the heater or chimney connector glows, you are overfiring. Other symptoms may include: Cracking, warping or burning out of components, stove glass may develop a haze, which will not come off with cleaning.

Overfiring of a stove is a condition where excessive temperatures are reached, beyond the design capabilities of the appliance. The damage that occurs from overfiring is not covered under the manufacturer's limited warranty.

Also see *Troubleshooting* on ***Page 22***.

SELECTING THE PROPER VENTING SYSTEM

The appliance is merely one component of a larger system. The other equally important component is the venting system. This is necessary for achieving the required flow of combustion air to the fire chamber and for safely removing unwanted combustion by-products from the appliance. If the venting system's design does not promote these ends, the system may not function properly. Poorly functioning venting systems may create performance problems as well as be a safety hazard. **A draft test should read greater than .04' W.C. (inches water column) and less than .08" W.C**. As per NFPA-211 standard (see paragraph below), the installer must take into account all variables within the installation and install the appliance in such a manner that satisfies the draft requirements of the appliance. See *Chimney Guidelines* below to assist you in selecting the proper venting system for your installation.

American National Standards Institute ANSI/NFPA 211, Standard for Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances - See Draft Section: A chimney or vent shall be so designed and constructed to develop a flow sufficient to completely remove all flue and vent gases to the outside atmosphere. The venting system shall satisfy the draft requirements of the connected appliance in accordance with the manufacturer's instructions.

Chimney Guidelines:

- This appliance requires approximately 12 feet minimum of "effective draw" provided by the venting system. As a rule of thumb, every 90 degree total direction change in the venting will result in a loss of approximately 5 feet of "effective draw." Example: If two 45 degree offsets are used, subtract 5 feet from the actual vertical vent height to determine your "effective draw." In this case if you had 14 feet of vertical vent, the effective draw would only be approximately 9 feet (14 ft. - 5 ft. = 9 ft.), therefore it may be necessary to add additional height to the venting system.
- Do not install an offset within the first two feet above the flue outlet on the appliance.
- In well insulated and weather tight homes, it may be difficult to establish a good draft up your chimney. The poor draft is caused by a shortage of air in the house. In this situation an Outside Air Kit may need to be installed *(See Negative Pressure Warning on* ***Page 5*** *and Outside Combustion Air on* ***Page 12****)*.

Chimney Height Requirements

The chimney must extend 3' (.92m) above the level of roof penetration and a minimum of 2' (.61m) higher than any roof surface within 10' (3m) *(see **Figure 1**)*. Check with your local building officials for additional requirements for your area.

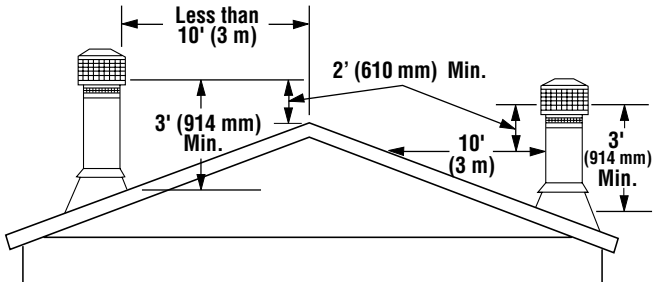


***Figure 1** - Chimney Height Requirements*

To pass inspection in nearly any jurisdiction, the chimney must meet both safety and exhaust flow requirements. The (3' by) 2' by 10' rule applies to both masonry and factory-built chimneys.

**** Ref. USA - National Standard, NFPA 211-latest edition and Canada National Standard CSA B365-01-latest edition. Vents installed with a listed cap shall terminate in accordance with the terms of the cap's listings.***

NEGATIVE PRESSURE WARNING

This appliance is not designed to be operated in a negative pressure. In very airtight homes with large kitchen exhaust fans, furnace cold air returns, fresh air exchange systems and any other air system in close proximity to the heating appliance may create a negative pressure in the same room as the heating appliance. This can create dangerous back drafting of the stove and chimney joints, drawing combustion by-products into the home. Be sure your home has adequate makeup air to eliminate negative pressures caused by the above-mentioned sources. Outside air connected to the appliance probably will not resolve such a problem as the appliance is not the source of negative pressure. IHP accepts no liability for damages resulting from negative pressures described here.

Ventilation Requirements - Provide adequate air for combustion. The fresh air requirements of this appliance must be met within the space where it will be installed. Ventilation is essential when using a Solid-Fuel-Burning heater. In well insulated and weather tight homes, it may be difficult to establish a good draft up the chimney (caused by a shortage of air in the home). The lack of air is caused by many common household appliances which exhaust air from the home (such as a furnace, heat pump, air conditioner, clothes dryer, exhaust fans, fireplaces, and other fuel burning appliances). Also, the combustion process of this heater uses oxygen from inside the dwelling. If the available fresh air delivery in the dwelling is insufficient to support the demands of these appliances, problems can result (i.e. excessive negative pressure can develop in the dwelling which will affect the rate at which this appliance can draft thus resulting in performance problems. To correct this problem it may help to open a window (preferably on the windward side of the house) or install an optional outside air kit.

CLEARANCES TO COMBUSTIBLES

WARNING: BE ABSOLUTELY SURE THE DISTANCE BETWEEN THE HEATER AND THE SURFACE OF ANY COMBUSTIBLE CONSTRUCTION IS NOT LESS THAN SHOWN IN THE FIGURES ON PAGE 7.

Floor Protection

USA - The floor in front and under the heater must be protected with noncombustible material. The covering must extend 16" in front of the door opening of the heater and 8" to either side of the door opening.

Canada - The floor in front and under the heater must be protected with noncombustible material. The covering must extend 450 mm in front of the door opening of the heater and 200 mm to either side of the stove body and 200 mm to the rear or to the wall, whichever is smaller.

USA and Canada - A chimney connector / venting extends horizontally over the floor, protection must also cover the floor under the connector / venting and at least 2" (51 mm) to either side.

CHIMNEY AND CONNECTOR

Minimum 6" diameter, minimum 24 MSG black steel connector pipe with UL103HT listed factory-built chimney suitable for use with solid fuels or masonry chimney. Horizontal connection not tested, refer to local building codes for installation. See installation instructions for details. Restrictions apply! Read instructions before installing.

Residential chimney systems must be from the same brands as listed for mobile homes but connector pipe may be double wall, single wall or single wall with shield as listed above.

This appliance may be vented into a code-approved masonry chimney with flue liner.

WARNING: CHIMNEY CONNECTOR MUST BE IN GOOD CONDITION AND KEPT CLEAN. DO NOT INSTALL DAMAGED PARTS.

All of the stove connector pipe used must be of the same brand. The chimney that the stove pipe transitions into may be a different brand. Other than the transition of the stove pipe into the chimney, do Not mix different brand vent components. Install all vent components per vent manufacturer's instructions.

The chimney connector shall not pass through an attic or roof space, closet or similar concealed space, or a floor, or ceiling. Where passage through a wall, or partition of combustible construction is desired, the installation shall conform to CAN/CSA-B365, Installation Code for Solid-Fuel-Burning Appliances and Equipment.

There must be an effective vapor barrier at the location where the chimney or other component penetrates to the exterior of the structure. Follow the vent manufacturer's detailed instructions.

IMPORTANT NOTE: See *Draft Requirements* and *Selecting a Proper Venting System* on ***Page 4*** to assist you in choosing the proper venting system for your installation.

Clearance dimensions are to flue collar. If a single wall connector pipe with shield is used, a 1 inch air space is needed between pipe and shield. Shield attaches to rear of stove pipe and must run from stove top to ceiling. Pipe shield shall be UL listed.

NOTE: DIAGRAMS & ILLUSTRATIONS ARE NOT TO SCALE.

INSTALLATION CLEARANCES - REFER TO *FIGURES 2, 3 AND 4*

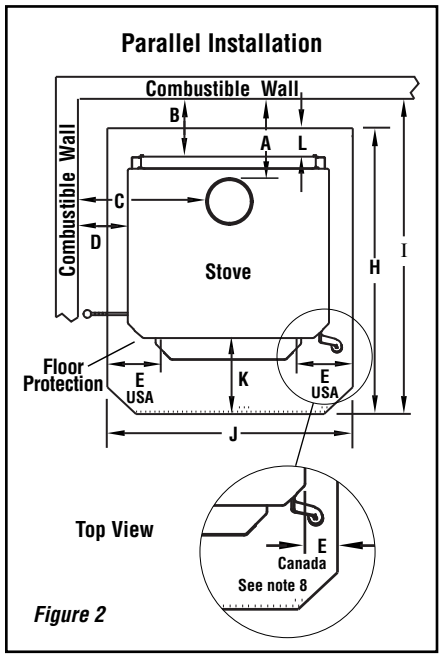


Figure 2

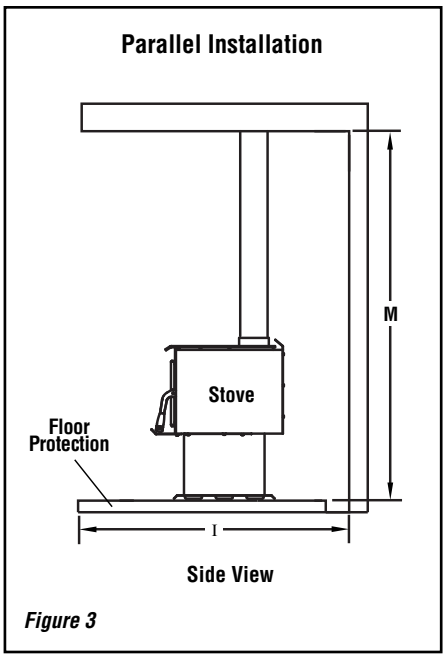


Figure 3

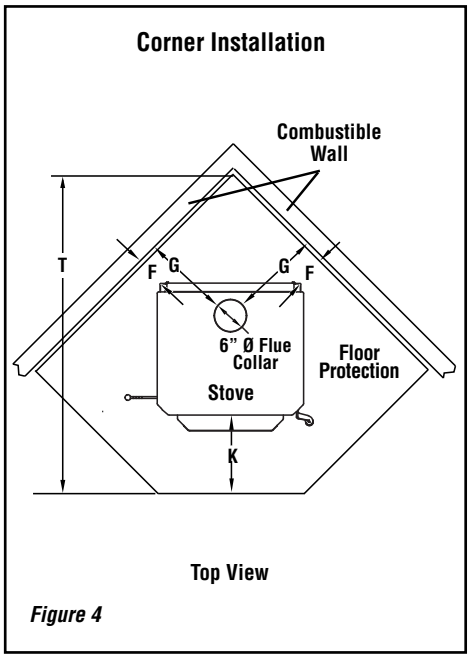


Figure 4

USA - inches (millimeters)

PIPE	INSTALLATION	A (3)	B (1)	C (3)	D (1)	E (8)	F (1)	G (3)	H (2)	I (6)	J (2)	K (7)	L (5)	M	T (6)
Single Wall	Residential	14-1/4 (362)	11-1/2 (292)	23 (584)	13-3/8 (340)	8 (200)	9 (229)	18 (457)	37-5/8 (956)	49 (1245)	34-7/8 (886)	16 (406)	0 (0)	84 (2134)	61-1/2 (1562)
Double Wall	Residential or Mobile Home	12 (305)	9-1/8 (232)	19-1/2 (495)	9-5/8 (245)	8 (200)	6 (152)	15 (381)	37-5/8 (956)	46-3/4 (1188)	34-7/8 (886)	16 (406)	0 (0)	84 (2134)	57-1/2 (1461)

CANADA - inches (millimeters)

PIPE	INSTALLATION	A (3)	B (1)	C (3)	D (1)	E (8)	F (1)	G (3)	H (2)	I (6)	J (2)	K (7)	L (5)	M	T (6)
Single Wall	Residential	14-1/4 (362)	11-1/2 (292)	23 (584)	13-3/8 (340)	8 (200)	9 (229)	18 (457)	47-5/8 (1210)	51 (1295)	40-7/8 (1038)	18 (450)	8 (200)	84 (2134)	63-1/2 (1613)
Double Wall	Residential or Mobile Home	12 (305)	9-1/8 (232)	19-1/2 (495)	9-5/8 (245)	8 (200)	6 (152)	15 (381)	47-5/8 (1210)	48-3/4 (1238)	40-7/8 (1038)	18 (450)	8 (200)	84 (2134)	59-1/2 (1511)

Footnotes:

1- These dimensions to the stove body are for reference only. Actual distances should be measured from the stove's flue collar.

2- Minimum noncombustible hearth pad dimensions.

3- Clearances to connector pipe shall be measured from the flue collar of the stove.

5- In corner applications, when installed at minimum back wall clearances, the required floor protection is dimensioned off the back plane of the stove, therefore the floor protection required off the back corners (at a 45 degree angle) only needs to extend to the wall. This situation will only occur in CANADA installations.

6- Reference dimension only, to assist in planning the installation.

7- Measured from front of floor protection to the front of firebox.

8- USA=8" (200mm) from door opening, Canada=8" (200mm) from sides and back of unit.

NOTE: DIAGRAMS & ILLUSTRATIONS ARE NOT TO SCALE.

SPECIFICATIONS - WXS2021WS-B

Product Reference Information			
Cat. No.	Description	Ship. Weight	Ship. Volume
TBD	WXS2021WS-B Wood-Burning Stove	310 lb.	23 cu. ft.

NOTES:

- *Dimensions shown are approximations only (+/- 1/4")*
- *Diagrams, illustrations and photographs are not to scale – consult installation instructions. Product designs, materials, dimensions, specifications, colors and prices are subject to change or discontinuance without notice.*
- *Approved for residential and manufactured home installations.*
- *Optional Kits Available:*

  Blower
  Outside Air Kit

❶ *Square-foot heating capacities and burn times are approximations only. Actual performance may vary depending upon home design and insulation, ceiling heights, climate, condition and type of wood used, appliance location, burn rate, accessories chosen, chimney installation and how the appliance is operated.*

Specifications

Stove Pipe Diameter Single Wall or Double Wall	**6" (152 mm)**
Log Length	**20" Max. (508 mm Max.)**
Firebox	**Volume = 2.1 cu. ft.**
Cord Wood: ❶	**76,000 BTUs/hr.**
Maximum Burn Times ❶	**7-9 hours**
Heating Capacity ❶	**1,200 to 2,000 sq. ft.**
EPA Grams Per Hour	**1.55 gr/hr**

EPA Certified and Washington State Approved

Listing

The WXS2021WS-B woodstove is safety
listed with the following agency:

- *PFS Corporation, Tested to UL 1482, ULC S627*

C PFS US

Report # 14-193

Dimensions

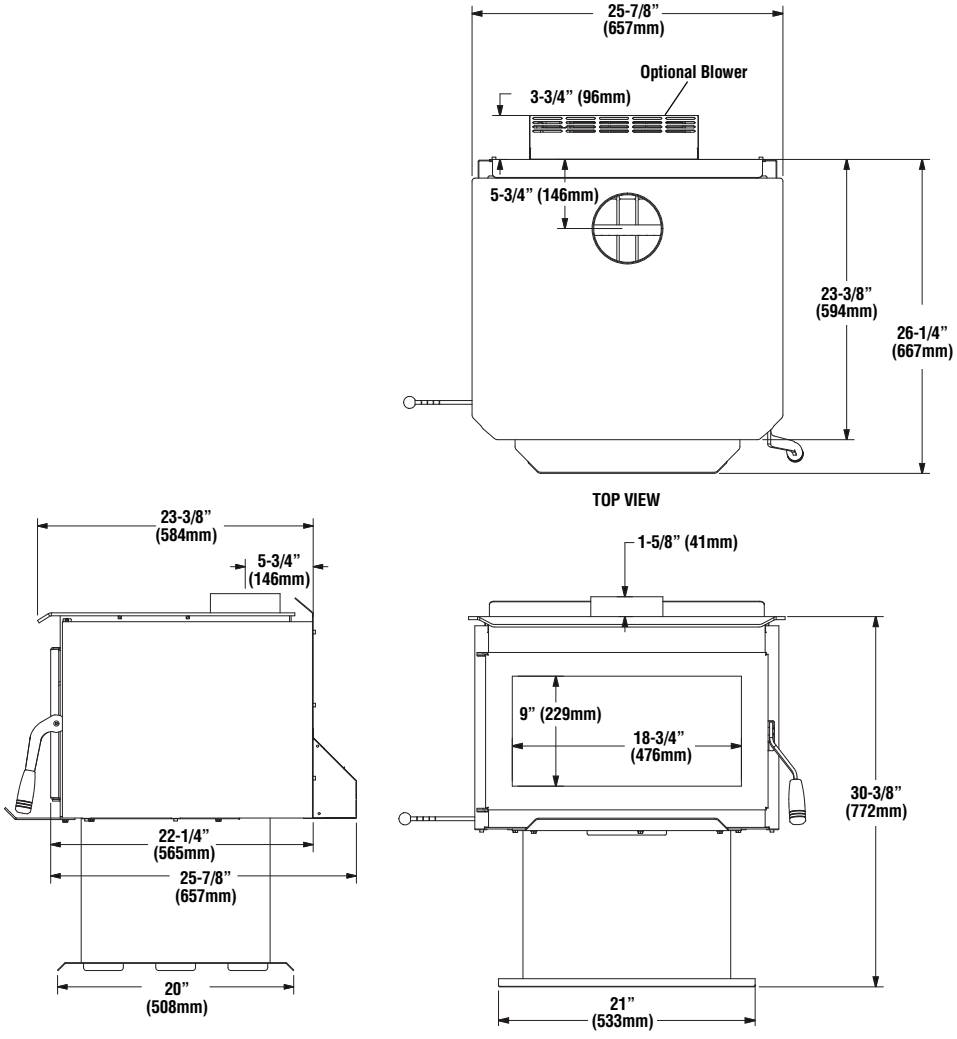


Figure 5

NOTE: DIAGRAMS & ILLUSTRATIONS ARE NOT TO SCALE.

TYPICAL INSTALLATIONS

YOUR CHIMNEY INSTALLATION MUST COMPLY WITH LOCAL BUILDING AND FIRE CODES.

Single Wall Pipe
Using 6” Diameter Single Wall Connector Pipe

INSTALL VENTING SYSTEM PER VENT MANUFACTURERS INSTRUCTIONS!

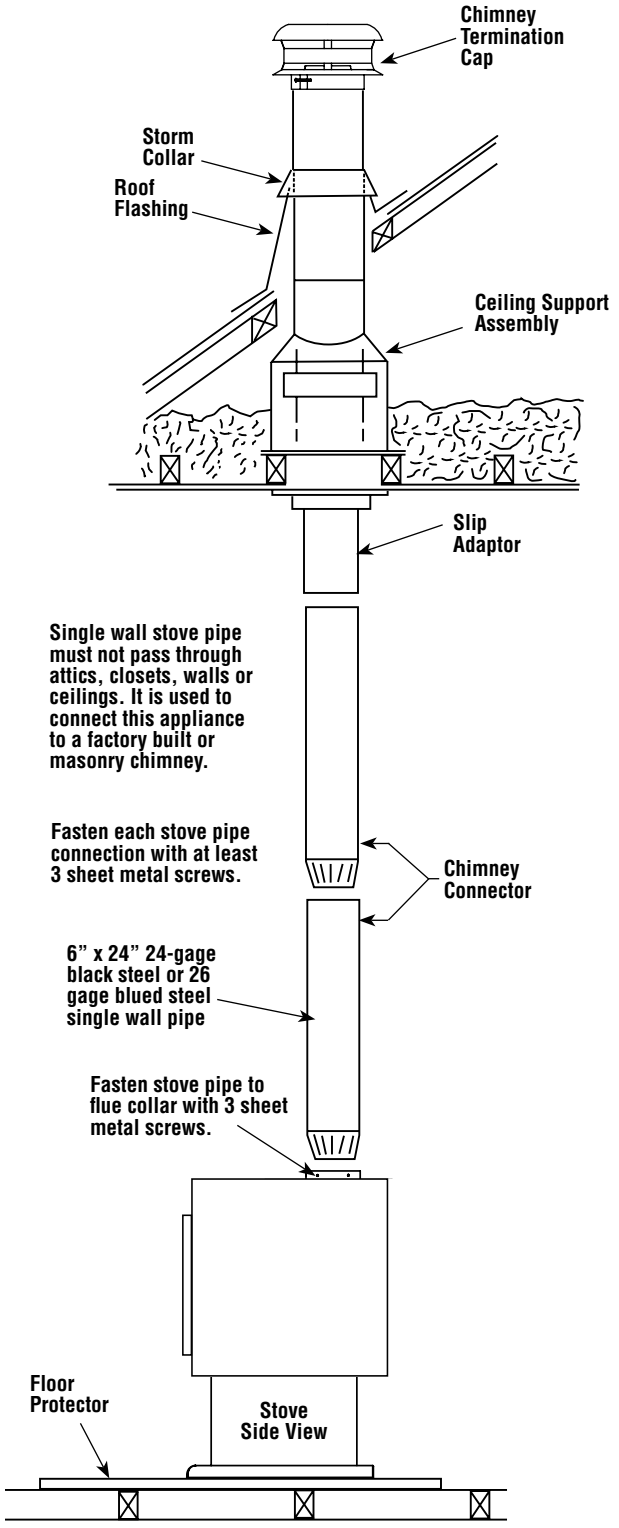


Figure 6 - Typical Installation

NOTE: DIAGRAMS & ILLUSTRATIONS ARE NOT TO SCALE.

CHIMNEY INSTALLATION

- Install chimney as per manufacturer's instructions. Some brands of pipe may require removal of the spacer ring in the flue collar.
- All horizontal runs of pipe should be as short as possible and are required by NFPA No. 211 to have an upward pitch or rise in the same direction the smoke travels of no less than 1/4" to the linear foot. The connector pipe must meet minimum clearances in any direction to walls or other combustible materials. It must attach to a listed double wall metal chimney at least 6" in diameter or to a masonry chimney with a flue passage of at least 48 square inches.
- It is required that a chimney connector pipe not extend further than the inner wall of the flue when it is connected to a masonry chimney and that it either be cemented to the masonry or be installed without cement in a thimble connected to the masonry wall. When the connector is inserted into a thimble, the joint must be tight enough so that it will not be dislodged in normal use.
- Chimney connector pipes should never pass through a floor, ceiling, fire wall, partition, or combustible construction of any type unless certain precautions are taken. The best method is to use a listed thimble and a listed chimney in accordance with the manufacturer's directions. NFPA No. 211 gives approved methods for passing a flue pipe through combustible constructions *(see **Page 11**)*.

Manufactured Home Installations *(ref. **Figure 8**)*

This appliance is approved for installation into a manufactured (mobile) home.

Installation should be in accordance with the Mobile Home Construction and Safety Standard, Title 24 CFR, Part 3280 (in Canada CAN/CSA Z240 MH), or, when such a standard is not applicable, the Standard for Mobile Home Installations, ANSI A225.1.

All mobile home installations require an outside air kit (see ***Page 24*** for ordering information). The stove must be secured to the floor and grounded to the chassis of the mobile home.

WARNING: DO NOT INSTALL IN SLEEPING ROOM OF A MOBILE HOME.

CAUTION: THE STRUCTURAL INTEGRITY OF THE MOBILE HOME FLOOR, WALL AND CEILING/ROOF MUST BE MAINTAINED.

Approved Chimney - Your stove is approved for use with Class A, UL 103 HT (U.S.) / ULC-S629 (Canada) Listed Residential Type and Building Heating Appliance Chimney (HT chimney - 2100° Fahrenheit) and double wall connector pipe**.** Approved chimney brands are Security Chimneys™, Jakes Evans/GSW, Dura-vent, Metal Fab, Ameri-Tec, Metalbestos and Industrial Chimney (ICC).

Clearances to connector shall be measured from 6" flue collar. Restrictions apply! Read instructions before installing.

YOUR CHIMNEY INSTALLATION MUST COMPLY WITH LOCAL BUILDING AND FIRE CODES.

Double Wall Pipe
Using 6" Diameter Type L-Vent Connector Pipe
Manufactured (Mobile) Home Installation Shown

INSTALL VENTING SYSTEM PER VENT MANUFACTURERS INSTRUCTIONS!

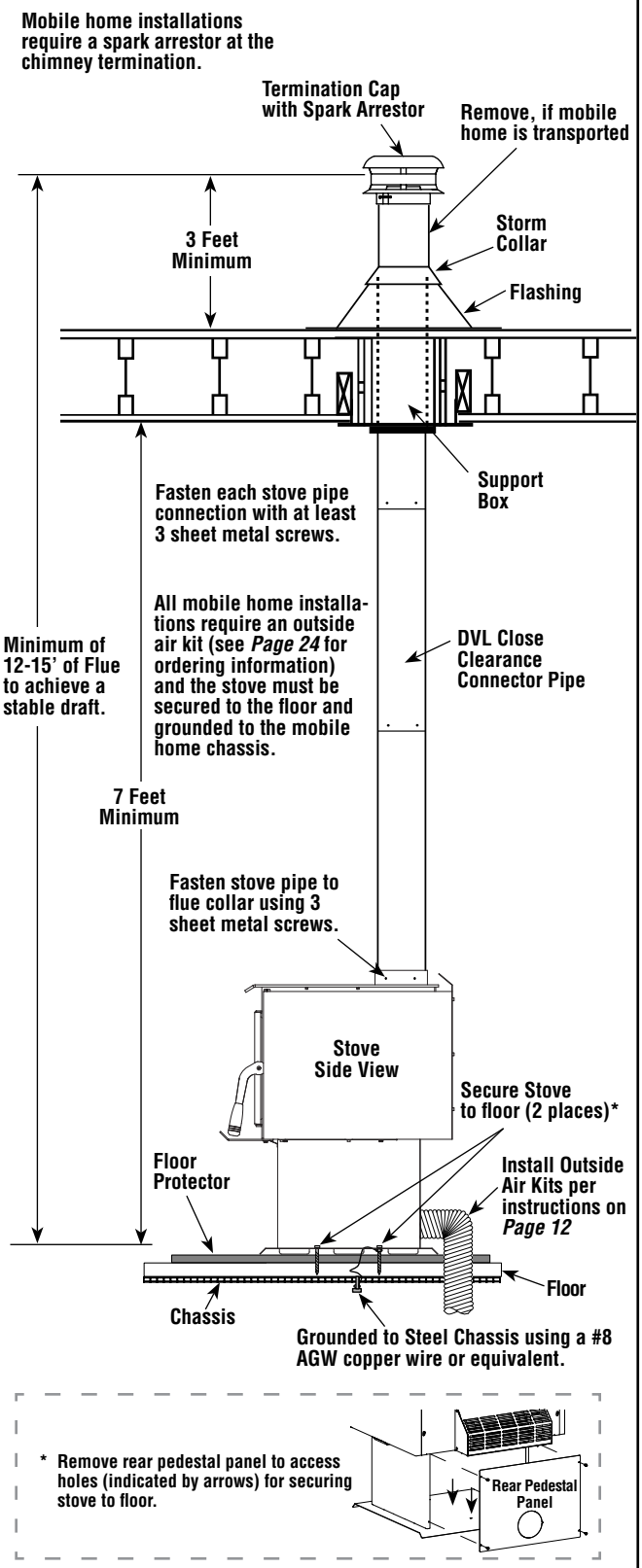


Figure 8 - Typical Installation

NOTE: DIAGRAMS & ILLUSTRATIONS ARE NOT TO SCALE.

Chimney Connector Systems and Clearances from Combustible Walls for Residential Heating Appliances (NFPA 211) - Refer to *Figure 9*

System A. Minimum 3.5 in. (90 mm) thick brick masonry wall framed into combustible wall with a minimum of 12 in. (305 mm) brick separation from clay liner to combustibles. Fireclay liner (ASTM C 315, Standard Specification for Clay Flue Linings, or equivalent), minimum 5/8 in. (16 mm) wall thickness, shall run from outer surface of brick wall to, but not beyond, the inner surface of chimney flue liner and shall be firmly cemented in place.

Clearance: 12 in. (305 mm)

System B. Solid-insulated, listed factory-built chimney length of the same inside diameter as the chimney connector and having 1 in. (25.4 mm) or more of insulation with a minimum 9 in. (229 mm) air space between the outer wall of the chimney length and combustibles.

The inner end of the chimney length shall be flush with the inside of the masonry chimney flue and shall be sealed to the flue and to the brick masonry penetration with non-water-soluble refractory cement. Supports shall be securely fastened to wall surfaces on all sides.

Fasteners between supports and the chimney length shall not penetrate the chimney liner.

Clearance: 9 in. (229 mm)

System C. Sheet steel chimney connector, minimum 24 gage [0.024 in. (0.61 mm)] in thickness, with a ventilated thimble, minimum 24 gage [0.024 in. (0.61 mm)] in thickness, having two 1 in. (25.4 mm) air channels, separated from combustibles by a minimum of 6 in. (152 mm) of glass fiber insulation. Opening shall be covered, and thimble supported with a sheet steel support, minimum 24 gage [0.024 in. (0.61 mm)] in thickness.

Supports shall be securely fastened to wall surfaces on all sides and shall be sized to fit and hold chimney section. Fasteners used to secure chimney section shall not penetrate chimney flue liner.

Clearance: 6 in. (152 mm)

System D. Solid-insulated, listed factory-built chimney length with an inside diameter 2 in. (51 mm) larger than the chimney connector and having 1 in. (25.4 mm) or more of insulation, serving as a pass-through for a single wall sheet steel chimney connector of minimum 24 gage [0.024 in. (0.61 mm)] thickness, with a minimum 2 in. (51 mm) air space between the outer wall of chimney section and combustibles. Minimum length of chimney section shall be 12 in. (305 mm). Chimney section concentric with and spaced 1 in. (25.4 mm) away from connector by means of sheet steel support plates on both ends of chimney section. Opening shall be covered, and chimney section supported on both sides with sheet steel supports of minimum 24 gage [0.024 in. (0.61 mm)] thickness.

Supports shall be securely fastened to wall surfaces on all sides and shall be sized to fit and hold chimney section. Fasteners used to secure chimney section shall not penetrate chimney flue liner.

Clearance: 2 in. (51 mm)

Additional requirements:

1. **Insulation material used as part of wall pass-through system shall be of noncombustible material and shall have a thermal conductivity of 1.0 Btu-in./hr-ft² - ºF (4.88 kg-cal/hr-m² - ºC) or less.**
2. **All clearances and thicknesses are minimums; larger clearances and thicknesses shall be permitted.**
3. **Any material used to close up an opening for the connector shall be of noncombustible material.**
4. **A connector to a masonry chimney, except for System B, shall extend in one continuous piece through the wall pass-through system and the chimney wall to the inner face of the flue liner, but not beyond.**

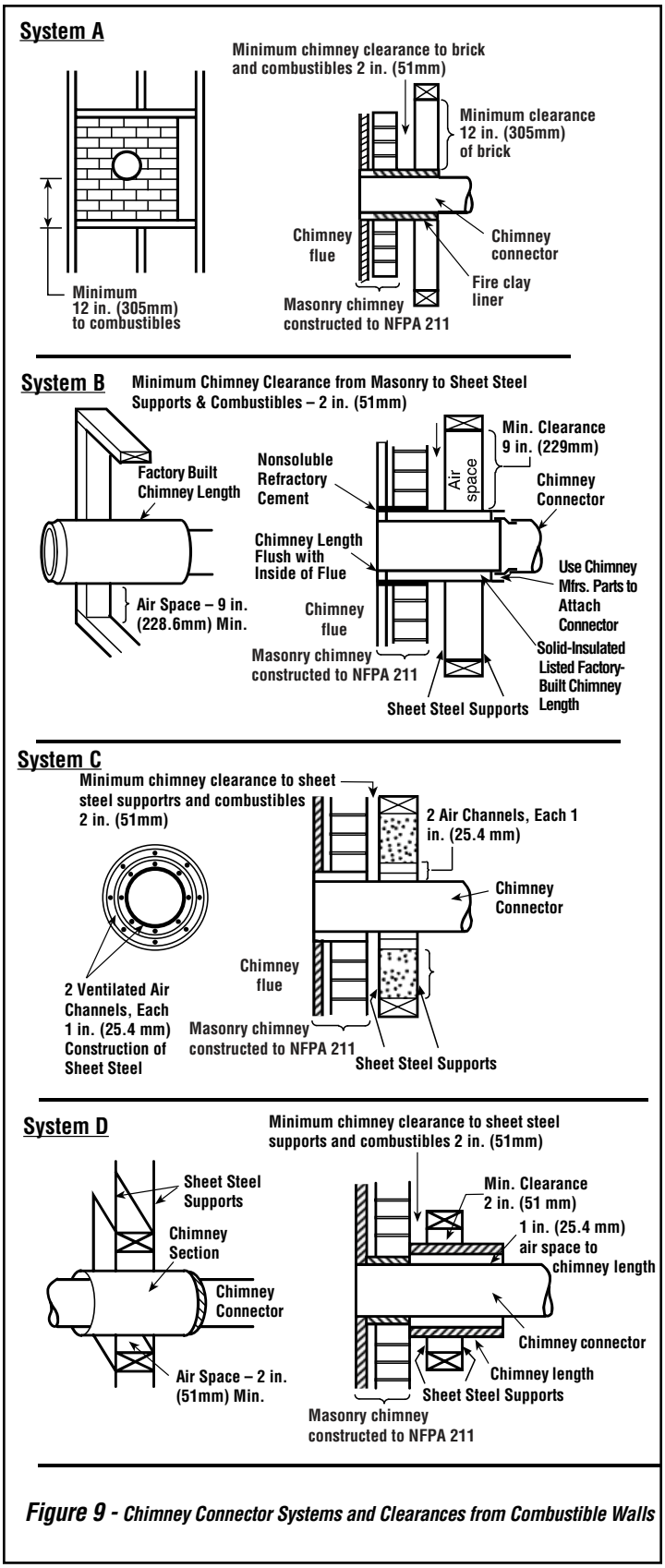


***Figure 9** - Chimney Connector Systems and Clearances from Combustible Walls*

NOTE: DIAGRAMS & ILLUSTRATIONS ARE NOT TO SCALE.

OUTSIDE COMBUSTION AIR KIT INSTALLATION

Outside Air Kits

Order:

1 ea. P/N UZIAD Outside Air Coupler Kit (connects outside air ducting, UZI, to stove)
AND
1 ea. P/N UZI Outside Air Ducting Kit (includes 4" insulated flex x 10' long)
AND
1 ea. P/N H8874 Outside Air Panel and Air Channel Kit (includes rear pedestal panel and side and front air channels)

An outside air kit is required in Manufactured (mobile) Home installations. For residential installations, check with local authorities having jurisdiction in your area, it may be mandatory.

INSTALLATION INSTRUCTIONS

1. **(Manufactured Home Installations Only)** Secure stove to floor per instructions in ***Figure 8*** on ***Page 10***.
2. **Install rear pedestal panel as shown in *Figure 11***.
3. **Install Outside Air Coupler** - Line up the "V" notch in the coupler with the "V" notch in the opening on the back of the pedestal *(see **Figure 11**)*. Push and twist so the rolled edge catches and continue turning a full 360° to lock the coupler in place.
4. **Install Ducting and Air Register *(refer to Figures 11 through 13)*** - The outside air assembly may be installed according to the following requirements:
   a) Duct length should be kept to a minimum.
   b) The air intake register must not be installed more than ten (10) feet (3050 mm) above the base of the stove.
   c) The fresh air must come from outside the house. The air intake must not draw air from the attic, from the basement or garage.
   d) The air intake should be installed where it is not likely to be blocked by snow or exposed to extreme wind and away from automobile exhaust fumes, gas meters and other vents.
   e) The duct and register may be installed above or below floor level.

   - Make a 4-1/4" (110 mm) hole in the outside wall of the house at the chosen location. From outside, place the outside air register in the hole (open side down) and fasten the register to the wall, with screws as shown *(see **Figures 12B and 13**)*.
   - Install the coupler onto the existing collar on stove *(see **Figure 11**)*.
   - Attach the duct to the coupler on stove *(see **Figures 12A and 12B**)*. Using the aluminium tape provided, wrap the tape around the joint between the flexible duct and the air inlet.
5. **Install Front and Side Air Channels** - Install the front and side air channels per the instructions in ***Figure 14*** on ***Page 13***.

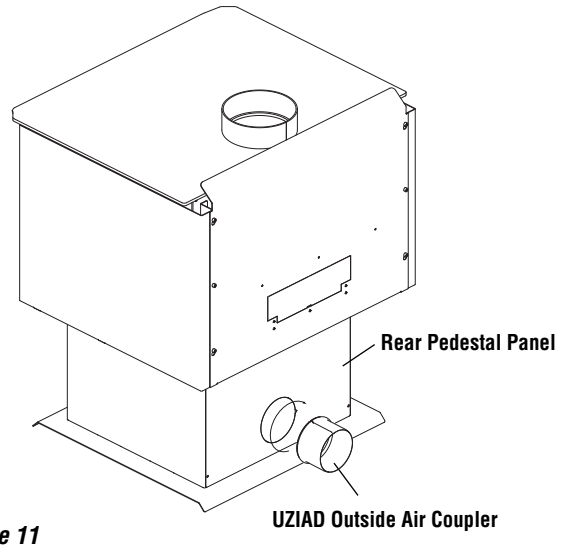


Figure 11

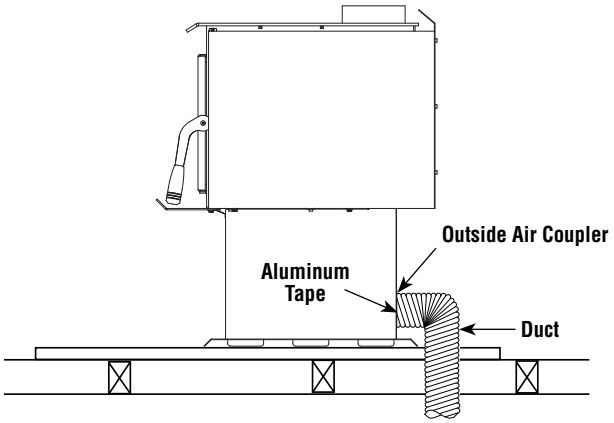


Figure 12A - Outside Air Connection, Through the Floor

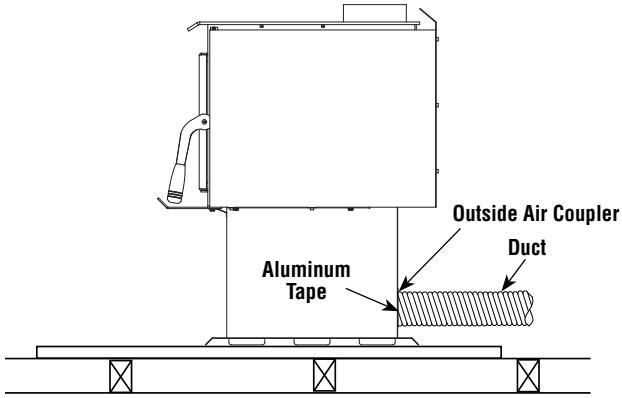


Figure 12B - Outside Air Connection, Through the Wall

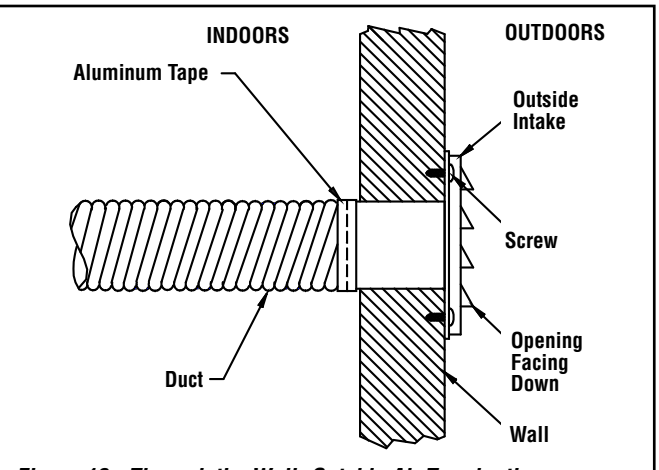
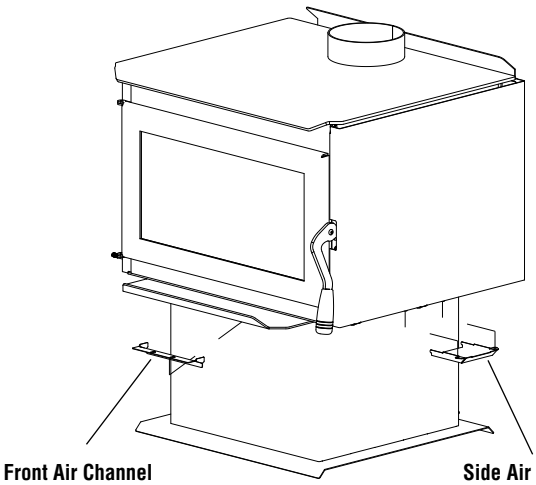
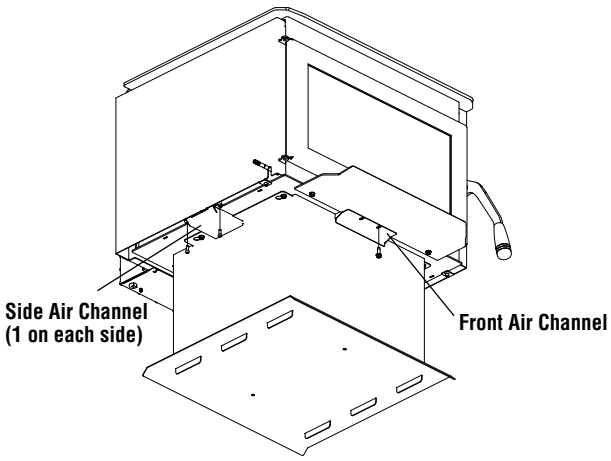


Figure 13 - Through the Wall, Outside Air Termination

See *Figure 8 on Page 10* for additional Manufactured Home requirements.

NOTE: DIAGRAMS & ILLUSTRATIONS ARE NOT TO SCALE.





Using the existing screws on the stove, install the front and side air channels as shown here.

Figure 14 - Install Front and Side Air Channels

BRICK INSTALLATION

CAUTION: Wear gloves during brick installation in case of sharp edges inside the stove.

Measure bricks before installing, as per list of dimensions in ***Figure 15***.

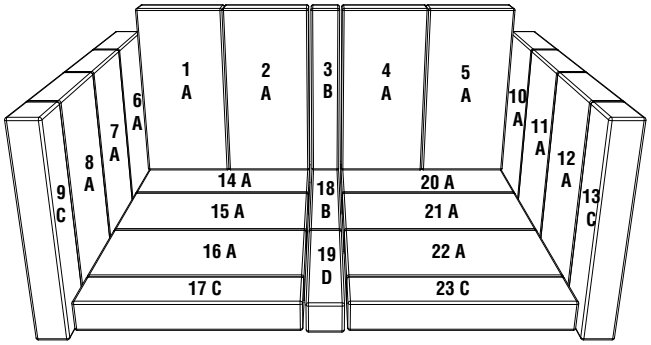
1. Install the brick as shown in ***Figure 15***.
2. The baffle boards are pre-installed. Ensure that they have not moved during shipping. Make sure all three baffle boards are resting on top of the secondary tubes, placed edge to edge, and positioned fully against the rear of the unit.

   CAUTION: It is critical that baffle boards are fully against the rear of the unit.

   These brick sizes may be slightly smaller to adjust for steel and firebrick tolerances beyond our control. Be sure to measure and mark bricks with their numbers when removing.

WARNING: IF THE BRICKS ARE NOT INSTALLED EXACTLY AS SHOWN, THEY COULD FALL OUT OF PLACE DURING REFUELING OR BURNING OF THE STOVE CAUSING SERIOUS INJURY.

Firebox Brick Layout as Viewed from the Front



Brick Sizes	
A = 4-1/2"x 9"	C = 2-1/8"x 9"
B = 1-1/2"x 9"	D = 1-1/2"x 6-3/4"

*** Bricks 6 and 10 fit up against the back of the firebox.**

Figure 15

Side Cut-A-Way View of Firebox

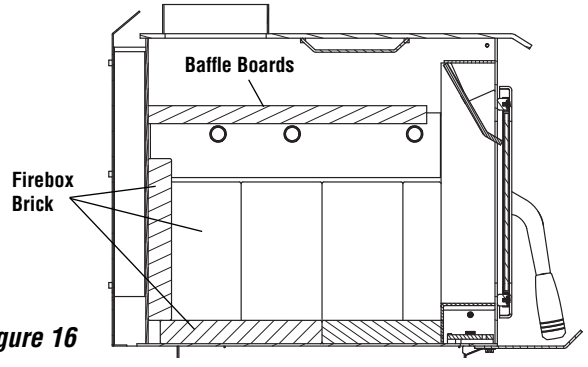


Figure 16

NOTE: DIAGRAMS & ILLUSTRATIONS ARE NOT TO SCALE.

FOR MOBILE HOME INSTALLS:

- ☐ Be sure the stove is properly grounded
- ☐ Be sure the stove is properly securely fastened to the floor
- ☐ Be sure the outside air vent is free of obstructions and has a mesh screen in place



POST INSTALLATION CHECKS

- ☐ Check that all chimney pipe joints are secured and installed according to the manufacturers instruction.
- ☐ If used, make sure the outside air kit is properly installed and unobstructed.
- ☐ Double check all stove clearances.
- ☐ Be sure bricks and baffle boards are properly installed.



FOR YOUR OWN PROTECTION AND INSURANCE PURPOSES, HAVE YOUR CHIMNEY AND CONNECTOR PIPE INSTALLATION INSPECTED BY YOUR LOCAL BUILDING CODE AUTHORITY OR FIRE MARSHAL BEFORE STARTING A FIRE IN YOUR STOVE. NOTIFY YOUR INSURANCE COMPANY.

NOTE: DIAGRAMS & ILLUSTRATIONS ARE NOT TO SCALE.

PAINT CURING

Do not close the door tightly during the "Burn-In Period." Also, open the door frequently (every 5-10 minutes) to keep the gasket from adhering to the curing paint. Ventilate the house well during these first firings as the paint gives off carbon dioxide and unpleasant odors. It is recommended that persons sensitive to an imbalance in the indoor air quality avoid the appliance during the curing process.

Your new appliance is painted with a high temperature paint that cures during the first few firings. We recommend that you put your stove or fireplace insert through a regimen of three burns. The first two should last for 20 minutes each at 250 degrees (the appliance should be allowed to cool completely between each burn). The third should be a burn of at least 450 degrees F. for 45-60 minutes. The paint will become soft, gummy and emit non-toxic smoke during these burns. After the appliance cools down for the third time, the paint will harden. **DO NOT BUILD A LARGE ROARING FIRE UNTIL THIS CURING EFFECT IS COMPLETE OR YOU MAY DAMAGE THE FINISH OF YOUR STOVE.** Spray can touch-ups should be done only with a high temperature stove paint (cat. no. H8159), available from all IHP dealers.

OPERATING HINTS

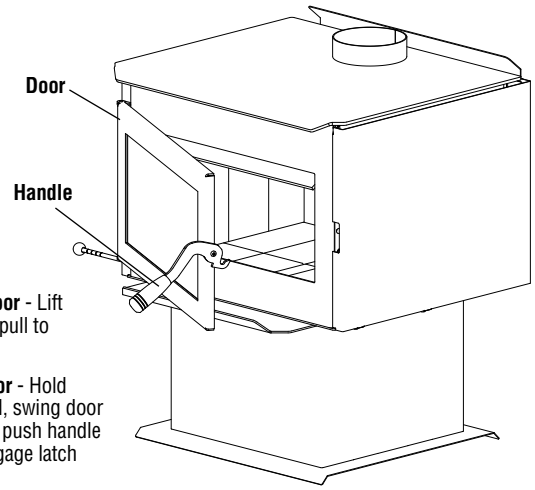
1. Burn only dry, well-seasoned cord wood. In some states it is illegal to burn wet wood or anything other than clean, dry wood products.
2. Your stove or fireplace insert is designed to operate with the door closed! Operate only with the door shut tightly at all times except when loading wood and possibly on start up to establish a draft. Never leave the unit unattended while the front door is opened.
3. **DO NOT** contact or move the baffle boards while loading wood. Occasionally check the baffle to assure that the boards are in there correct location.
4. **CAUTION: THE DRAFT CONTROL MUST BE FULLY OPEN BEFORE OPENING THE DOOR TO AVOID POSSIBLE COMBUSTION FLASH!!** (Ignition of hot volatile gases as the door is opened).
5. Feeding excessive amounts of fuel to the appliance should be avoided. It is important to supply it with sufficient draft and fuel to maintain a moderately hot fire. If, during overnight burns, heavy creosote deposits develop inside your stove and on the door, the draft is set too low - review your burning habits!

DOOR OPERATION

Do not operate the appliance with the door open or ajar other than possibly during start up to create a draft (Do not leave the unit unattended while the front door is slightly open during start up). Operating the appliance with the door open other than in initial start up if needed will produce extreme temperatures within the appliance. Damage caused from over-firing is not covered under the manufacturers limited warranty.

⚠ WARNING

Be careful not to abuse door assembly by striking or slamming it. If the door assembly or glass is broken or damaged, they must be replaced with factory original parts before heater can be safely operated. Use only components provided by the manufacturer as replacement parts.



Opening Door - Lift handle and pull to open door

Closing Door - Hold handle lifted, swing door closed then push handle down to engage latch

Figure 18

NOTE: DIAGRAMS & ILLUSTRATIONS ARE NOT TO SCALE.

STARTING AND MAINTAINING A FIRE

1. **NEVER USE FLAMMABLE LIQUIDS TO START OR REKINDLE A SOLID FUEL FIRE!!**
2. Fully open the primary draft control by placing draft control (wood handle located on left side of the stove) in the highest position. This control determines the amount of air entering the stove. Lowering this control reduces the burn rate of the stove.
3. Place a small amount of crumpled paper in the front of the firebox and cover it with a few pieces of kindling.
4. Light the paper and allow sufficient time for the kindling to become fully engulfed in flames. You will now close the wood units front door. Your wood units front door may or may not need to be left slightly open during this start up process, this depends on the stove model and the amount of draft present.
5. **When operating any wood burning appliance, it is important to become familiar with how the damper control affects heat output and the overall temperature of the appliance. A stove thermometer can be a helpful tool to help ensure you are not over-firing your appliance and it will also ensure you are burning fuel at a rate that is most efficient. Place a stove thermometer on the top of the appliance as shown in *Figure 19*. Monitor the temperature every 15 minutes or so until you become more familiar with your appliance. Close the damper all the way down if you begin to reach 600 degrees, as this is a sign that you are operating your appliance at too high a temperature.**

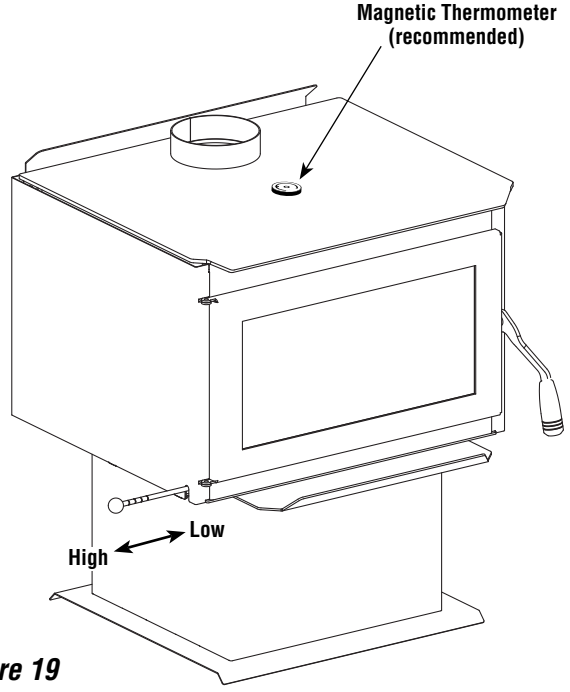


Figure 19

DO NOT LEAVE THE STOVE UNATTENDED WHILE THE FRONT DOOR IS SLIGHTLY OPEN.

CAUTION: Do Not alter the adjustment range of the draft control for increased firing for any reason.

Operate only with fuel door closed. Maintain all seals in good condition. Do not operate with broken glass.

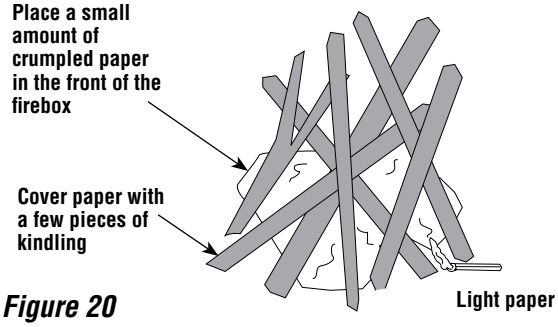


Figure 20

SEE MAINTENANCE SECTION FOR GLASS CLEANING GUIDELINES AND TIPS FOR KEEPING THE GLASS CLEAN *(PAGE 22)*.

6. Once kindling is burning well, larger pieces of wood may be added, then the door should be fully closed if there was the need to keep it slightly open during start up.
7. For best results, use smaller pieces of wood to get the appliance temperature very high before loading larger wood for sustained burns. If necessary, crack the door to allow ignition of the fuel charge. Now you can add larger pieces of wood and after several minutes of high burn, set the left control for the desired heat output. Check the exhaust in about 15 to 20 minutes *(see **Figure 22**)*. Large amounts of smoke indicate an improper burn setting (either too high or too low). Adjust and recheck in 5 to 10 minutes.

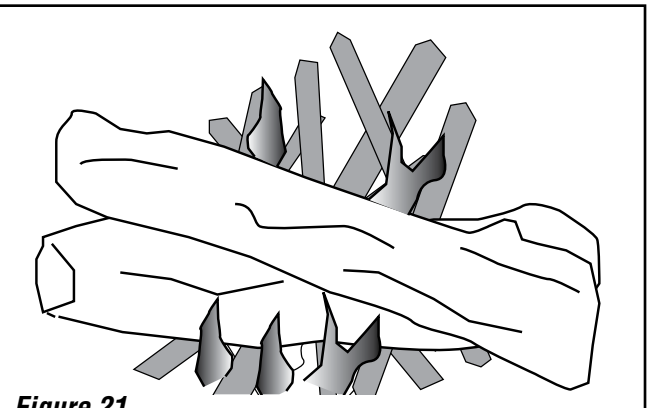


Figure 21

NOTE: DIAGRAMS & ILLUSTRATIONS ARE NOT TO SCALE.

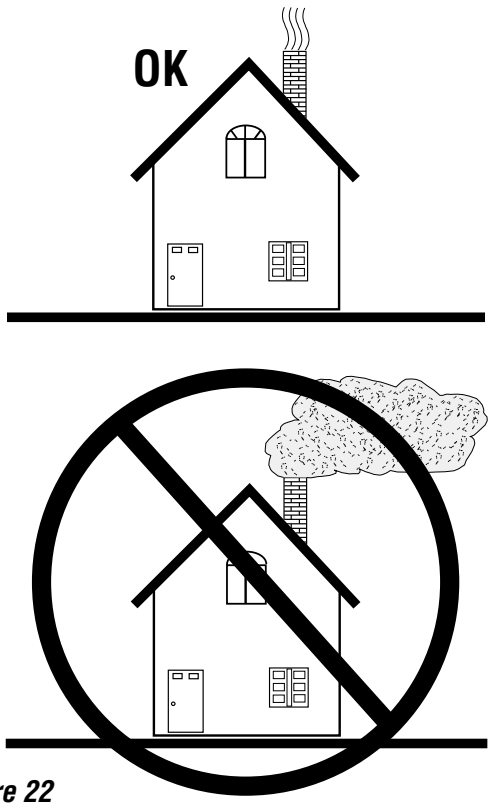


Figure 22

FUEL

This appliance is designed to burn dry seasoned natural wood only (see *Page 20* for a list of prohibited fuels). Failure to burn proper fuels only will void the certification and the warranty of the appliance.

Dry, seasoned wood is that which has been cut, split and allowed to dry under a covered area where air is free to flow and circulate under and around the wood (not under a tarp or plastic). Make sure wood is not stacked directly on the ground, it may absorb moisture from the ground. It should be allowed to dry in these conditions for a minimum of six months, preferably one year or more. **IT MUST BE UNDERSTOOD THAT WOOD CANNOT BE LEFT IN ANY KIND OF WET OR DAMP AREA OR IT WILL NEVER BECOME COMPLETELY SEASONED.**

Do not store fuel within space heater installation clearances or within the space required for refueling and ash removal.

DO NOT OVERFIRE THIS HEATER

Attempts to achieve heat output rates that exceed heater design specifications can result in permanent damage to the heater.

What does "Well-Seasoned" mean?

When a tree is cut down, the wood is green, full of sap and moisture. This moisture content can exceed 80%, which must be reduced to less than 20%. Wood properly seasoned is then capable of generating the heat the stove was designed to provide.

Green wood does not burn easily. Attempting to burn green wood often results in a lot of smoke and very little fire. Time is the most important factor in seasoning wood. Ideally the moisture content should be reduced to 11-20%. ***NOTE: The use of a firewood moisture meter is recommended to ensure the firewood contains less than 20% moisture.***

Seasoning Guide
Softwoods – 6 months to 18 months
Hardwoods – 12 months to 24 months

Logs that are 5" diameter across or larger should be split in half, three pieces if over 8 inches, and four pieces when over a foot across. If a tree has been dead for 2 – 4 years it still needs to be cut, split, and seasoned for 6 to 24 months depending on the wood.

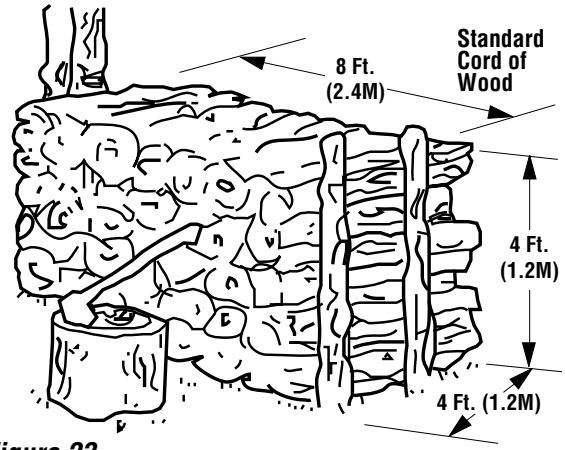


Figure 23

NOTE: DIAGRAMS & ILLUSTRATIONS ARE NOT TO SCALE.

GETTING THE MOST OUT OF YOUR STOVE

Recent developments in wood-burning technology have made wood-burning a cleaner and more convenient way to heat your home. Overall efficiency in a wood-burning appliance is a combination of combustion efficiency and heat transfer efficiency. Whether heating your entire home or just a room or two, your understanding of how to best operate your stove or insert will enhance its overall efficiency and performance. What this can mean to you is longer, cleaner burns, less wood use and more heat.

The following sections will outline techniques you can use to "get the most out of your stove." Please read them carefully.

MAXIMIZING YOUR STOVE'S OVERALL EFFICIENCY

It is important to know that for clean highly efficient burns you will need to have sufficient temperatures inside the firebox for thorough combustion. The best method for determining if you have sufficient temperatures is to watch the brick lining in your firebox. When you first light your stove or fireplace insert, the firebrick will turn a dark brown or black. After 20 to 30 minutes of a hot fire, most of the bricks should return to near their original beige color. This means the firebrick have reached a high enough temperature for your stove to achieve high combustion efficiency and you are ready to adjust the draft control to a lower setting.

Second and just as important, is achieving a high level of heat transfer efficiency. Slowing the rate of flow through the stove or insert enhances heat transfer, thus allowing more time for heat to be transferred into your home. To do this, be sure to thoroughly preheat your stove and then reduce the amount of primary air by closing the draft control down to a lower setting. (More air may produce a slightly greater amount of heat, but will greatly increase wood consumption).

To get the most out of your appliance, you will need to combine good combustion efficiency with good heat transfer practices. The following are some tips on how to operate your stove to achieve the highest overall efficiency.

1. Thoroughly preheat your stove before slowing the burn rate by closing the draft control.
2. When loading wood into a preheated stove or fireplace insert, allow a vigorous fire to build before lowering the draft control.
3. Operate your stove as much as possible in the low to medium burn ranges.
4. Do not lower the draft setting so low as to completely extinguish the flames in the firebox. Check for at least some small flames twenty minutes after setting the draft control.
5. Do not continually operate your stove or fireplace insert in the high (wide open) setting. This wastes wood by carrying a great deal of heat up the chimney and can damage your stove or fireplace insert and chimney.
6. Go outside and check your chimney. More than a very small amount of smoke indicates wasted heat, creosote build up and pollution *(see **Figure 22**)*.

ACHIEVING CLEAN, LONG BURNS

To achieve long burn times, after having thoroughly preheated the stove, load the firebox without blocking the small air opening found in the center front of the firebox. At this point, you may need to burn the stove with the draft open for a few minutes to ignite the wood. All IHP stoves are EPA tested for emissions at low burn with the air control completely closed. Whether or not you should burn your stove with the air control completely closed will depend on the following factors:

- How you load your wood
- Your chimney type, height and draft
- Your wood type and its moisture content
- The temperature of the appliance
- Which model stove or insert you have

In order to maximize the burn time of your stove you may need to experiment to get the right balance of starting temperature, wood type, and draft control setting for your particular venting configuration. Do not reload the stove for long burns when the stainless secondary tubes or baffles are glowing red, or when the stove is uncomfortably hot to load. This indicates the stove is too hot to load for a long burn.

NOTE: DIAGRAMS & ILLUSTRATIONS ARE NOT TO SCALE.

OPTIONAL BLOWER KIT

The optional blower is controlled by a Dial-a-Temp *(see **Figure 24**)*. It contains an On/Off line switch with variable speed control from low to high.

1) Install the optional blower kit per the instructions provided in the blower kit.
2) Plug the blower power cord into the receptacle on the bottom of the Dial-A-Temp.
3) Plug the connected Dial-A-Temp into a properly grounded, 120 VAC wall outlet.
4) To operate, rotate the dial on the Dial-A-Temp clockwise until it clicks on. Rotate the dial further clockwise for a lower speed, then counter-clockwise for a higher speed.

NOTE: Turn blower off before opening the door to load the fuel.

⚠ WARNING

The blower must be plugged directly into a properly grounded three-prong receptacle, 120 VAC, 60 Hz, single phase. Do not cut or remove the grounding prong from this plug. Do not route power cord under or in front of appliance.

Installation must be in accordance with National Electrical Code, ANSI/NFPA 70 - latest edition. In Canada, the current CSA C22.1 Canadian Electrical Code - latest edition.

DANGER: Disconnect power before servicing blower.

OPTIONAL BLOWER KIT

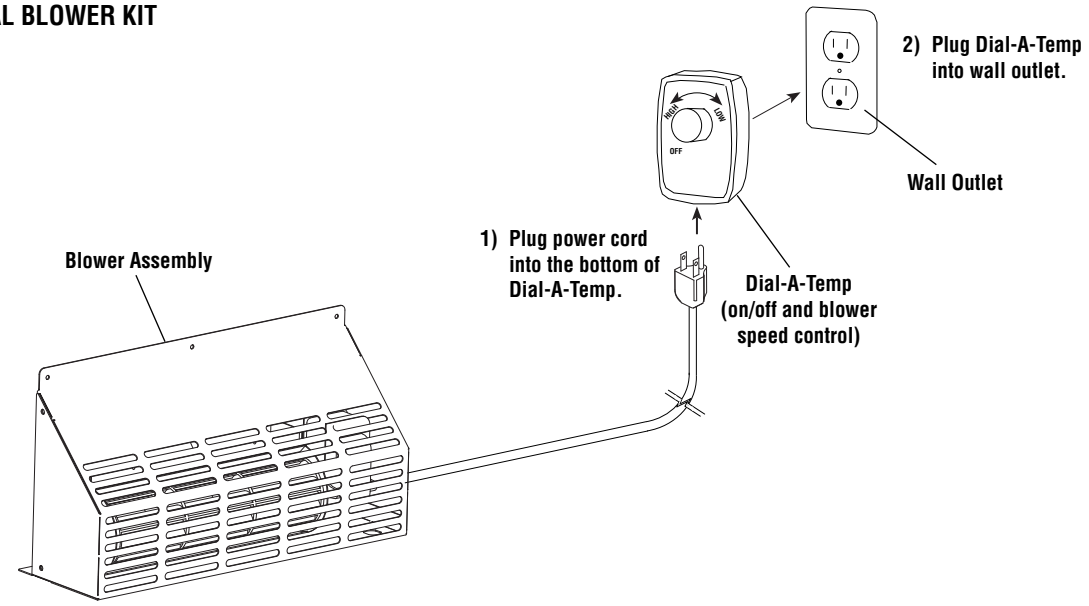


Figure 24

⚠ WARNING

In the event that you remove the blower for any reason, the rear heatshield must be returned to its original condition or replaced before using the heater. Excessive rear wall temperatures will result if the stove is burned with the blower opening unobstructed.

NOTE: DIAGRAMS & ILLUSTRATIONS ARE NOT TO SCALE.

DO'S AND DON'TS

DO NOT: Install or operate the appliance before reading this manual.

DO NOT: Close the draft beyond the point at which the flames are completely extinguished.

DO NOT: Open the appliance door without **fully opening** the draft first.

DO NOT: Burn driftwood or wood that has been in salt water. This includes some mill ends and scrap lumber that has been floated in salt water on the way to the mill. (This will void your warranty).

DO NOT: Force oversized logs into the firebox as this may dislodge the baffle assembly.

DO NOT: Close the door tightly during Burn-In Period.

DO: Consult local building department if other than recommended clearances are desired.

DO: Read instructions for the baffle boards occasionally to ensure you have not bumped or moved them out of place when loading wood.

DO: Check the chimney and baffle monthly to make sure they are clean.

DO: Burn seasoned, dry wood only! (RAIN = WET WOOD)

DO: Open the door frequently during Burn-In Period to keep gasket from adhering to the curing paint.

DO: Enjoy the warm feeling of your new IHP appliance.

SMOKE DETECTOR RECOMMENDED

Since there are always several potential sources of fire in any home, we recommend installing smoke detectors. If possible, install the smoke detector in a hallway adjacent to the room (to reduce the possibility of occasional false activation from the heat produced by these appliances). If your local code requires a smoke detector be installed within the same room, you must follow the requirements of your local code. Check with your local building department for requirements in your area.

CARBON MONOXIDE MONITOR RECOMMENDED

Carbon Monoxide Poisoning: Early signs of carbon monoxide poisoning are similar to the flu with headaches, dizziness and/or nausea. If you have these signs, obtain fresh air immediately. Some people are more affected by carbon monoxide than others, including pregnant women, people with heart or lung disease or anemia, those under the influence of alcohol, and those at high altitudes.

It is against federal regulations to operate wood heaters in a manner inconsistent with operating instructions in the manual.

PROHIBITED FUELS

This heater is designed to burn natural wood only. Higher efficiencies and lower emissions generally result when burning air dried seasoned hardwoods, as compared to softwoods or to green or freshly cut hardwoods. DO NOT BURN:

- **Garbage;**
- **Lawn clippings or yard waste;**
- **Materials containing rubber, including tires;**
- **Materials containing plastic;**
- **Waste petroleum products, paints or paint thinners, or asphalt products;**
- **Materials containing asbestos;**
- **Construction or demolition debris;**
- **Railroad ties or pressure-treated wood;**
- **Manure or animal remains;**
- **Salt water driftwood or other previously salt water saturated materials;**
- **Unseasoned wood;**
- **Christmas tree branches;**
- **Paper products, colored paper, cardboard, plywood, or particleboard;**
- **gasoline;**
- **naphtha;**
- **engine oil;**
- **flammable liquids;**
- **solvents;**
- **grease; or**
- **coal**

The prohibition against burning these materials does not prohibit the use of fire starters made from paper, cardboard, saw dust, wax and similar substances for the purpose of starting a fire in an affected wood heater.

Burning these materials may result in release of toxic fumes or render the heater ineffective and cause smoke. Intense firing with these materials may overheat the fireplace, causing damage to the unit, a fire or even possibly igniting a chimney fire if the chimney is creosoted. Burning unapproved fuel, resulting in excessive pollutants being emitted, may be prohibited and subject to a fine or other penalty by the authority having jurisdiction in your area.

MAINTENANCE

Have your product inspected at least once a year by a qualified service technician to ensure gaskets, air tubes, baffles, and venting are in good repair to ensure proper performance. Have degraded items replaced by a qualified service technician.

THIS WOOD HEATER NEEDS PERIODIC INSPECTION AND REPAIR FOR PROPER OPERATION. IT IS AGAINST FEDERAL REGULATIONS TO OPERATE THIS WOOD HEATER IN A MANNER INCONSISTENT WITH OPERATING INSTRUCTIONS IN THIS MANUAL.

DOOR HINGES: If door hinges need lubricating, use an anti-seize compound (never use oil) available from your IHP dealer.

DOOR LATCH: Adjustment Instructions -

1. Using a 5/32" hex wrench, remove the side heat shield by removing 3 screws on the back, 2 screws on the bottom, and 1 screw at the top-front corner.
2. With the door open, loosen the latch nuts using a 3/8" wrench. Slide the latch assembly forward to loosen the door and backward to tighten the door.
3. Secure the nuts in place and test the door. If more adjustment is required, repeat step 2.
4. Replace the heat shield before burning the stove.

The hinge side of the door can also be adjusted if necessary. Repeat the procedure above on the hinge side of the stove.

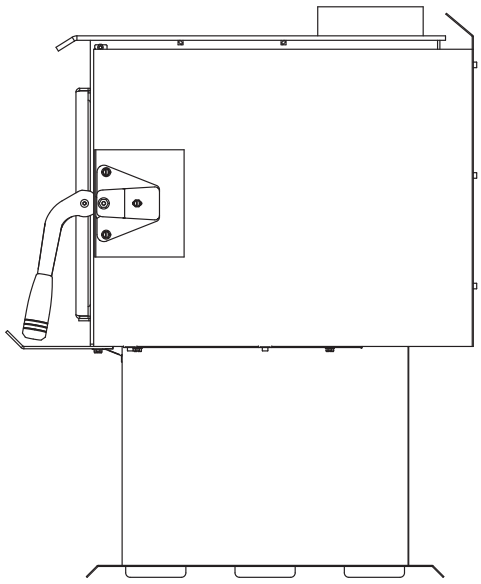


Figure 27

DOOR GASKET: Periodically check gasket to make sure it is not over-compressed. If compressed, replace with a special woven door rope. (Don't try substituting rope, only use IHP door rope).

BAFFLE BOARDS: Your baffle boards should be inspected during every chimney cleaning. If either board is damaged then replace baffle boards.

CREOSOTE FORMATION AND NEED FOR REMOVAL

When wood is burned slowly, it produces tar and other organic vapors, which combine with expelled moisture to form creosote. The creosote vapors condense in the relatively cool chimney flue of a slow-burning fire. As a result, creosote residue accumulates on the flue lining. When ignited, this creosote makes an extremely hot fire.

The chimney and chimney connector should be inspected at least once monthly during the heating season to determine if a creosote buildup has occurred. If creosote has accumulated (1/8" [3 mm] or more), it should be removed to reduce the risk of a chimney fire.

Establish a routine for the fuel, wood burner and firing technique. Check daily for creosote build-up until experience shows how often you need to clean to be safe. Be aware that the hotter the fire the less creosote is deposited, and weekly cleaning may be necessary in mild weather even though monthly cleaning may be enough in the coldest months. Contact your local municipal or provincial fire authority for information on how to handle a chimney fire. Have a clearly understood plan to handle a chimney fire.

DISPOSAL OF ASHES

Whenever ashes get 3 to 4 inches deep in your firebox, and when the fire has burned down and cooled, remove excess ashes. Leave an ash bed approximately 1 inch deep on the firebox bottom to help maintain a hot charcoal bed.

Ashes should be scooped out of a cool stove or fireplace insert with a small metal shovel. Ashes should be placed in a steel container with a tight fitting lid and moved outdoors immediately. Other waste shall not be placed in this container. The closed container of ashes should be placed on a non-combustible floor or on the ground, well away from all combustible materials, pending final disposal. If the ashes are disposed of by burial in soil or otherwise locally dispersed, they should be retained in the closed container until all the cinders have thoroughly cooled. Ashes can ignite up to 72 hours after removal from the appliance.

⚠ WARNING

Inspect and clean chimney and connector frequently. Under certain conditions of use, creosote buildup may occur rapidly.

MAINTENANCE

GLASS REPLACEMENT INSTRUCTIONS
*(Refer to **Figure 26**)*

Step 1. Remove Door Assembly - Remove the upper and lower hinge pins by pressing the bottom of each hinge pin up, then pull out from the top. Lift off door and place face down on a soft surface.

Step 2. Remove Glass Retainer Nuts (10 ea.) - Using an 3/8" nut driver or wrench remove the ten glass retainer nuts. To locate nuts, peel back the door gasket as necessary.

Step 3. Remove Glass - Carefully remove broken glass one piece at a time (protective leather gloves are recommended).

Step 4. Clean Door Frame - Clean the area of the door frame where the new glass with gasket will be installed.

Step 5. Install New Glass Assembly - Install the new glass with gasket (use only factory supplied 5mm ceramic glass with gasket. Do not substitute).

Step 6. Reinstall Retainer and Nuts - Carefully reinstall the glass retainer and nuts. Be very careful not to overtighten the nuts (this could result in glass breakage when the stove is hot).

Step 7. Reinstall Door - Align hinges on door frame with corresponding hinge holes on the face of stove. Reinstall the upper and lower hinge pins from the top.

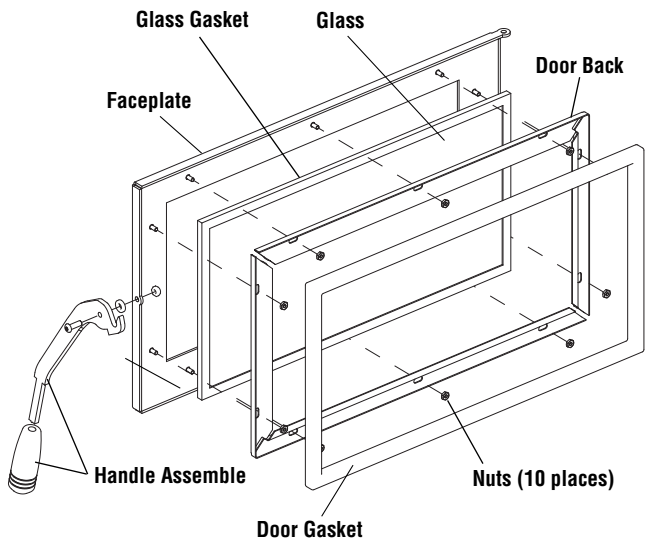


Figure 26 - Glass Replacement

GLASS CLEANING GUIDELINES

WARNING: DO NOT CLEAN GLASS WHEN APPLIANCE IS HOT!
Glass on any wood stove will not stay perfectly clean. Here are some guidelines for cleaning and caring for the glass:

- **Ensure the stove is cold prior to cleaning glass.**
- This appliance is designed to provide a flow of air over the inside of the glass, where along with high heat helps inhibit build-up on the glass. When build-up occurs, a commercial glass cleaner designed for stoves is recommended. Regular household glass cleaners will not clean creosote.
- Do not use abrasives such as steel pads, steel wool or oven cleaner as they will scratch the glass. Never scrape glass with a razor blade as this may pit the glass and make it impossible to clean in the future.
- Do not use chemical glass cleaners as they may damage the gaskets or painted surfaces.

TIPS FOR KEEPING THE GLASS CLEAN

- Burn only dry seasoned cord wood. **Wet wood = Dirty glass.**
- A short, hot fire (15 - 20 minutes) may help to clean off some of the normal buildup. **Lower burns = more build-up. Higher burns = less build-up.**
- Keep freshly loaded wood away from the glass.
- After reloading, allow all the wood to catch flame before dampering down the stove.

⚠ CAUTION

Cleaning Glass: Ensure appliance is cold prior to cleaning glass. A commercial glass cleaner designed for stoves is recommended. Do not use abrasive cleaners. Do not clean with any materials, which may scratch or otherwise damage the glass. Scratches on the glass can develop into cracks or break. Inspect the glass regularly. If you detect a crack, extinguish the fire and contact your dealer for a replacement.

TROUBLESHOOTING

Problem	Solution
POOR DRAFT:	Extend chimney in length or have the chimney realigned to the proper size flue. Oversized chimneys normally have poor drafts. Remember, the appliances' draft depends solely on the natural draft of the chimney (See Draft Requirements on ***Page 4***). If your stove or fireplace insert is not drafting properly, your chimney is the problem. All stoves are thoroughly tested to ensure proper draft with the correct size chimney flue.
EXCESSIVE DRAFT:	With better chimneys being more common, excessive draft can be an issue. Alleviate excessive draft by slowing the burn rate of the appliance once it has reached proper operating temperature (See Maximizing Your Stoves Overall Efficiency on ***Page 18***).
DIRTY GLASS:	1) Burn smaller, hotter fires and check to make sure you are not setting the draft down too far with the draft control. 2) Make sure your wood is well-seasoned and dry (not open to rain - see Creosote and Fuel sections on ***Page17 and 22***). 3) See Poor Draft section (above) and Cleaning Glass on ***Pages 4 and 22***.
SMOKES WHEN DOOR IS OPEN:	1) If smoke is entering the room, check to make sure your baffle boards are properly installed. 2) Check the chimney for blockage due to creosote (see Chimney and Creosote sections on ***Page 22***). 3) Check draft (See POOR DRAFT section above).
WOOD BURNS TOO FAST:	1) The draft control must be closed further. 2) Add fuel at lower firebox temperatures. 3) Load wood side to side and reduce the flow of air under wood. 4) The door seal may need replacing, check for leakage. 5) See "Excessive Draft."
POOR HEAT OUTPUT:	1) Check your wood. Wet, moist, unseasoned wood will not produce heat. 2) Your stove or fireplace insert needs to be seasoned (moisture removed from the steel and brick). Continue to burn a fire. It normally takes from one to three weeks of burning to season your stove (See Burn-In Period on ***Page 15***). 3) See Excessive Draft section above.
PAINT GIVES OFF ODOR (smoke):	Paint is tempering-in. Burn only moderately hot for the first few days until paint is fully cured. Then burn a very hot fire to cure any paint that may not easily cure. Open windows or door to ventilate (See Burn-In Period on ***Page 15***).

REPLACEMENT PARTS - MODEL WXS2021WS-B

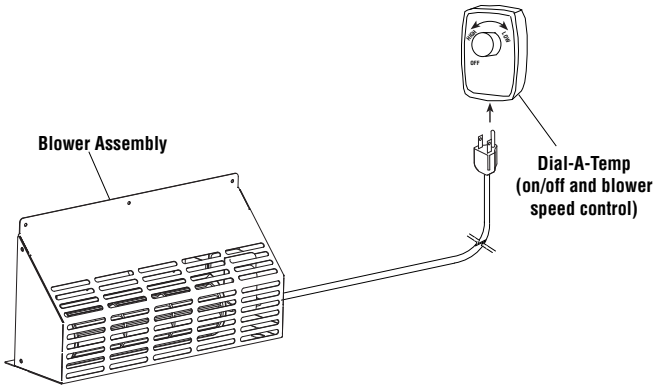
Contact an IHP dealer to obtain any of these parts. Never use substitute materials. Use of non-approved parts can result in poor performance and safety hazards.

Cat. No	Description
H8890	Right side heat shield
H8891	Left side heat shield
H8892	Back heat shield
F2629	Cast door assembly
H8894	Door channels w/nuts
H8895	Glass
H5640	Glass gasket kit (8’ 4”)
H5639	Door rope kit, 7/8” dia. (6’ 2”)
H8897	Baffles
H8898	Secondary burn tubes w/clamps
H5650	Draft rod knob
H8899	Ash lip w/hardware
H8900	Pedestal
H8901	Door handle w/hardware
H8902	Door latch w/hardware
H8896	Complete Firebrick kit

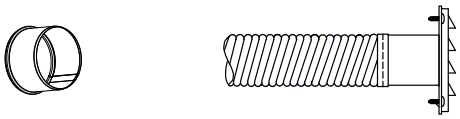
ACCESSORIES - MODEL WXS2021WS-B

OPTIONAL ACCESSORIES		
Cat. No.	Model	Description
BLOWER		
H8873	BLWR-ES-S-150	Blower Kit, WXS2021WS-B
OUTSIDE AIR KIT		
UZIAD	UZIAD	Outside Air Coupler Kit (connects outside air ducting, UZI, to stove) AND -
UZI	UZI	Outside Air Ducting Kit (includes 4" insulated flex x 10' long) AND -
H8874	OUTAIRKIT-ES	Outside Air Panel and Air Channel Kit (includes rear pedestal panel and side and front air channels)
MISC.		
H8159	TSPK-B	Touch-Up Paint , Metallic Black, 12 oz. Aerosol

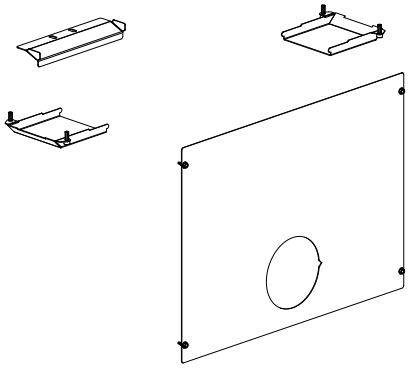
OPTIONAL BLOWER KIT



OUTSIDE AIR KITS



UZIAD UZI



H8874

TOUCH-UP PAINT



NOTE: DIAGRAMS & ILLUSTRATIONS ARE NOT TO SCALE.

SAFETY / LISTING LABEL - MODEL WXS2021WS-B

CONTACT LOCAL BUILDING OR FIRE OFFICIALS ABOUT RESTRICTIONS AND INSTALLATION INSPECTION IN YOUR AREA. ROOM HEATER, SOLID FUEL TYPE, ALSO FOR USE IN MOBILE HOMES PURSUANT TO (UM) 84-HUD.
COMMUNIQUEZ AVEC LES AUTORITÉS LOCALES EN BÂTIMENT OU LE SERVICE DE PRÉVENTION DES INCENDIES POUR CONNAÎTRE LES NORMES D'INSTALLATION ET D'INSPECTION DE VOTRE RÉGION. APPAREIL DE CHAUFFAGE CERTIFIÉ POUR COMBUSTIBLE SOLIDE PEUT-ÊTRE INSTALLÉ DANS UNE MAISON MOBILE SELON (UM) 84-HUD

Superior FIREPLACES®

Report No./Numéro de Rapport	Model / Modèle	Serial No./Numéro de sérle:
14-193	WXS2021WS-B	WXS2021WS-B-

Manufactured By / Fabriqué Par:
Innovative Hearth Products
1502 14th St NW
Auburn, WA 98001 USA

Tested to: UL 1482, ULC S627
Type Of Fuel: Solid Wood Only
Optional Blower, Part No. H8873, Model BLWR-ES-S-150
Blower Electrical Rating: 120V, 60 Hz, 1 Amp
Do not route power cord under or in front of appliance.
Replace glass only with 5mm ceramic.
Operate only with doors closed.
Do not obstruct the space beneath the heater.
This wood heater needs periodic inspection and repair for proper operation. Consult the owner's manual for further information. It is against federal regulations to operate this wood heater in a manner inconsistent with the operating instructions in the owner's manual.
Certification test emission value 1.55 grams/hr per 2020 cordwood standard

"PREVENT HOUSE FIRES"

Install and use only in accordance with manufacturer's installation and operating instructions and your local building codes.

CAUTION: Special methods are required when passing chimney through a wall or ceiling, refer to installation instructions and local building codes. Do not connect this unit to a chimney flue serving another appliance.

CAUTION: Moving Parts May Cause Injury. Do Not Operate Unit With Blower Cover Removed.

WARNING: Burning improper fuel (e.g. charcoal) can result in carbon monoxide poisoning, which may lead to death!

WARNING: (MOBILE HOME USA Only) An outside air inlet must be provided for combustion, and be unrestricted while unit is in use. Do not install appliance in a sleeping room. The structural integrity of the mobile home floor, walls and ceiling/roof must be maintained. Approval void when label is missing.

Tested to/Testé selon: UL 1482, ULC S627
Type de combustible: Bois seulement
Ventilateur Optionnel, No. De Pièces: H8873, Modèle BLWR-ES-S-150
Spécification Électrique Du Ventilateur: 120V, 60 Hz, 1 Amp
Ne pas faire passer le fil électrique sous ou en avant de l'appareil
Remplacez la vitre seulement avec la céramique de 5 millimètres.
Faire functionner uniquement lorsque les portes sont fermées.
Ne pas obstruer l'espace sous la bouche de chaleur.
Cet appareil de chauffage au bois doit être inspecté et entretenu périodiquement pour fonctionner correctement. Voir le manuel du propriétaire pour plus d'information. L'utilisation de cet appareil de chauffage au bois de manière incompatible avec les instructions du manuel du propriétaire constitue une infraction aux régulations fédérales.
Valeur d'émission du test d'homologation 1,55 g/h selon la norme 2020

"PREVENTION DES INCENDIES"

Installer et utiliser l'appareil en conformité avec les directives d'installation du fabricant et des autorités locales en bâtiment ou le service de prévention des incendies.

ATTENTION : Prenez des précautions spéciales lorsque vous faites passer une cheminée à travers un mur ou un plafond, référez-vous aux instructions d'installation et aux codes locaux de la construction. Ne pas brancher cette unité à un conduit de fumée raccordé à un autre appareil.

ATTENTION : Des pièces en mouvement peuvent causer des blessures. Ne pas opérer le ventilateur avec son protecteur retiré.

AVERTISSEMENT : La combustion d'un combustible inadapté (charbon) peut provoquer une intoxication au monoxyde de carbone et entraîner la mort !

AVERTISSEMENT : (MAISON MOBILE USA seulement) Une entrée d'air extérieure doit être installée et libre de toute restriction lors de l'utilisation de l'appareil. Ne pas installer l'appareil dans une chambre à coucher. L'intégrité structurale du plancher, des murs et du plafond/toit de la maison mobile doivent être maintenus.

CHIMNEY & CONNECTOR: Minimum 6" diameter, minimum 24 MSG black steel connector pipe with UL103HT listed factory-built chimney suitable for use with solid fuels or masonry chimney. Horizontal connection not tested, refer to local building codes for installation. Clearances to connector shall be measured from 6" flue collar. Restrictions apply! Read instructions before installing.

Mobile Home approved Class A - UL 103HT chimney and double wall connectors:
- **Security**
- **Jakes Evans/GSW**
- **Dura-Vent**
- **Metal Fab**
- **Ameri-Tec**
- **Metalbestos**
- **IndustrialChimney**

RESIDENTIAL chimney systems must be from the same brands as listed for mobile homes but connector pipe may be double wall or single wall.

Connector pipe and chimney must be of the same brand.

If optional blower is NOT used, Rear Heat Shield Block Off Plate shall be in place.

CHEMINÉE ET TUYAU CONNECTEUR : Approuvé pour raccordement avec un conduit de raccordement en acier noir 24 jauges minimum de 6" de diamètre et une cheminée préfabriquée certifiée pour combustible solide ou une cheminée de maçonnerie. Non certifié pour installation horizontale, référez-vous aux autorités locales en bâtiment. Des restrictions s'appliquent! Lisez les directives avant d'effectuer l'installation.

MAISON MOBILE (USA SEULEMENT) : cheminée certifiée Classe A – UL103HT et tuyaux connecteurs doubles parois :
- **Security**
- **Jakes Evans/GSW**
- **Dura-Vent**
- **Metal Fab**
- **Ameri-Tec**
- **Metalbestos**
- **Industrial Chimney**

RÉSIDENTIEL: Cheminée de la même marque de commerce que pour les maisons mobiles ci-dessus, mais le tuyau connecteur peut-être à double ou simple parois.

Le tuyau connecteur et la cheminée doivent être de la même marque de commerce.

Si l'option du ventilateur n'est pas utilisé, la plaque arrière coupe radiation doit être en place.

Made in U.S.A.
Fabriqué aux U.S.A.

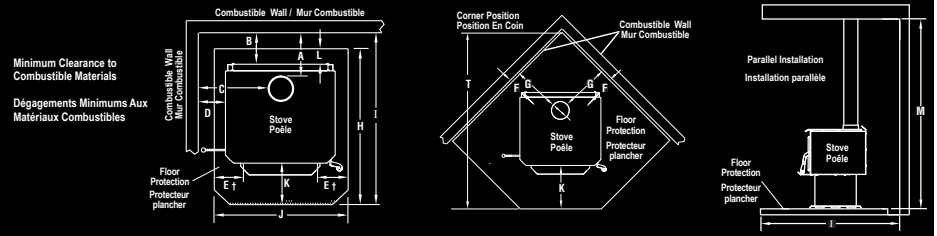
Date of Manufacture / Date De Fabrication

2019	2020	2021	JAN JANV	FEB FEVR	MAR MARS	APR AVR	MAY MAI	JUN JUIN	JUL JUIL	AUG AOÛT	SEP SEPT	OCT OCT	NOV NOV	DEC DEC
■	■	■	■	■	■	■	■	■	■	■	■	■	■	■

DO NOT REMOVE THIS LABEL
NE PAS ENLEVER OU RECOUVRIR CETTE ÉTIQUETTE

Part No./No. Pièce 900979-03 Rev. 0, 04/2019

U.S. ENVIRONMENTAL PROTECTION AGENCY
Certified to comply with 2020 cordwood standard.



USA inches (millimeters)	PIPE	INSTALLATION	A	B	C	D	E	F	G	H	I	J	K	L	M	T
	Single Wall / Simple Paroi	Residential / Résidentielle	14-1/4 (362)	11-1/2 (292)	23 (584)	13-3/8 (340)	8 (200)	9 (229)	18 (457)	37-5/8 (956)	49 (1245)	34-7/8 (886)	16 (406)	0 (0)	84 (2134)	61-1/2 (1562)
	Double Wall / Double Parois	Residential or Mobile Home / Résidentielle ou maisons mobiles	12 (305)	9-1/8 (232)	19-1/2 (495)	9-5/8 (245)	8 (200)	6 (152)	15 (381)	37-5/8 (956)	46-3/4 (1188)	34-7/8 (886)	16 (406)	0 (0)	84 (2134)	57-1/2 (1461)

Canada pounces (millimètres)	PIPE	INSTALLATION	A	B	C	D	E	F	G	H	I	J	K	L	M	T
	Single Wall / Simple Paroi	Residential / Résidentielle	14-1/4 (362)	11-1/2 (292)	23 (584)	13-3/8 (340)	8 (200)	9 (229)	18 (457)	47-5/8 (1210)	51 (1295)	40-7/8 (1038)	18 (450)	8 (200)	84 (2134)	63-1/2 (1613)
	Double Wall / Double Parois	Residential or Mobile Home / Résidentielle ou maisons mobiles	12 (305)	9-1/8 (232)	19-1/2 (495)	9-5/8 (245)	8 (200)	6 (152)	15 (381)	47-5/8 (1210)	48-3/4 (1238)	40-7/8 (1038)	18 (450)	8 (200)	84 (2134)	59-1/2 (1511)

† USA=8" (200mm) from door opening, Canada=8" (200mm) from sides and back of unit

FLOOR PROTECTOR: The hearth and/or floor protection must be a non-combustible hearth/floor protector with a minimum thickness of 3/8" (9.5mm), extending beneath the heater and to the front, sides, and rear as indicated.

SUITABLE FOR MOBILE-HOME INSTALLATION.

NOTICE: All mobile home installations require outside air kits (H8874).

Clearance dimensions are to flue collar.

† USA= 8" (200mm) à l'avant de la porte, Canada 8" de chaque côté de l'appareil.

PANNEAU PROTECTEUR PLANCHER : Les panneaux protecteurs doivent être non combustible, dont l'épaisseur minimale est de 3/8" (9.5mm) et doivent s'étendre sous l'appareil, à l'avant des portes, à l'arrière et de chaque côté tel qu'indiqué.

CONÇU POUR MAISONS MOBILES.

AVIS: USA SEULEMENT - Toutes les installations dans une maison mobile requièrent un ensemble de prise d'air extérieur (H8874).

Les distances de dégagement sont pour un conduit de 6".

CAUTION

HOT WHILE IN OPERATION. DO NOT TOUCH, KEEP CHILDREN, CLOTHING AND FURNITURE AWAY. CONTACT MAY CAUSE SKIN BURNS. SEE NAMEPLATE AND INSTRUCTIONS. DO NOT OVERFIRE. IF HEATER OR CHIMNEY CONNECTOR GLOWS, YOU ARE OVERFIRING. INSPECT AND CLEAN CHIMNEY AND CONNECTOR FREQUENTLY. UNDER CERTAIN CONDITIONS OF USE, CREOSOTE BUILDUP MAY OCCUR RAPIDLY. DO NOT USE GRATE OR ELEVATE FIRE - BUILD WOOD FIRE DIRECTLY ON HEARTH. FEED DOOR MUST BE CLOSED DURING FIRING EXCEPT WHEN ADDING FUEL. KEEP ASH DOOR CLOSED TO AVOID EXCESS HEAT. DANGER: RISK OF ELECTRICAL SHOCK. DISCONNECT POWER BEFORE SERVICING UNIT. FOR USE WITH SOLID WOOD FUEL ONLY.

ATTENTION

L'APPAREIL EST CHAUD LORS DE L'OPÉRATION. NE PAS Y TOUCHER. RISQUE DE BRÛLURES CUTANÉES. TENIR LES ENFANTS, LES MATÉRIAUX COMBUSTIBLES, LES VÊTEMENTS ET LES MEUBLES ELOIGNÉS DE L'APPAREIL. VOIR LA PLAQUE SIGNALÉTIQUE ET LES DIRECTIVES. NE PAS SURCHAUFFER L'APPAREIL. SI L'APPAREIL OU LE TUYAU DE CHEMINÉE ROUGIT, VOUS SURCHAUFFEZ. INSPECTER ET NETTOYER LA CHEMINÉE ET LE TUYAU CONNECTEUR FRÉQUEMMENT. SOUS CERTAINES CONDITIONS, IL SE PEUT QUE LE CRÉOSOTE S'ACCUMULE RAPIDEMENT. NE SURÉLEVER PAS LE FEU À L'AIDE D'UN CHENET. DÉPOSER LES BÛCHES DE BOIS DIRECTEMENT SUR L'ÂTRE. LA PORTE DOIT ÊTRE FERMÉE PENDANT L'USAGE SAUF POUR ALIMENTER LE FEU. GARDER LA PORTE "BY-PASS" (CENDRES) FERMÉE POUR ÉVITER DE SURCHAUFFER. DANGER: RISQUES DE DÉCHARGE ÉLECTRIQUE. DÉCONNECTER LE FIL ÉLECTRIQUE DE LA PRISE DE CONTACT AVANT LE SERVICE. NE PAS FAIRE PASSER LE FIL ÉLECTRIQUE SOUS OU EN AVANT DE L'APPAREIL. POUR USAGE AVEC LE BOIS SEULEMENT.

Innovative Hearth Products
Superior® Brand Wood-Burning Stove and Insert
5 Year Limited Warranty

THE WARRANTY

Innovative Hearth Products ("IHP") 5 Year Limited Warranty warrants your Superior® Brand wood stove or insert ("Product") to be free from defects in materials and workmanship at the time of manufacture. The Product body, firebox, removable air tubes and ceramic glass carry the 5 Year Limited Warranty. Ceramic glass carries the 5 Year Limited Warranty against thermal breakage only. After installation, if covered components manufactured by IHP are found to be defective in materials or workmanship during the 5 Year Limited Warranty period and while the Product remains at the site of the original installation, IHP will, at its option, repair or replace the covered components. If repair or replacement is not commercially practical, IHP will, at its option, refund the purchase price or wholesale price of the IHP product, whichever is applicable. IHP will also pay IHP prevailing labor rates, as determined in its sole discretion, incurred in repairing or replacing such components for up to one year. THERE ARE EXCLUSIONS AND LIMITATIONS to this 5 Year Limited Warranty as described herein.

COVERAGE COMMENCEMENT DATE

Warranty coverage begins on the date of purchase. In the case of new home construction, warranty coverage begins on the date of first occupancy of the dwelling or six months after the sale of the Product by an independent IHP dealer/distributor, whichever occurs earlier. The warranty shall commence no later than 24 months following the date of product shipment from IHP, regardless of the installation or occupancy date.

EXCLUSIONS AND LIMITATIONS

This 5 Year Limited Warranty applies only if the Product is installed in the United States or Canada and only if operated and maintained in accordance with the printed instructions accompanying the Product and in compliance with all applicable installation and building codes and good trade practices.

This warranty is non-transferable and extends to the original owner only. The Product must be purchased through a listed supplier of IHP and proof of purchase must be provided. The Product body and firebox carry the 5 Year Limited Warranty from the date of installation. Vent components, trim components and paint are excluded from this 5 Year Limited Warranty. The following are warranted as follows:

Cast iron parts – Replacement for one year from the date of installation
Electrical components – Repair or replacement for one year from date of installation
Gaskets – Replacement for one year from the date of installation
Refractory & screens – Replacement for two years from date of installation. Excludes hairline cracks
Removable air tubes – Repair or replacement for five years from date of installation. IHP prevailing labor rates for one year from the date of installation.
Labor coverage – Prevailing IHP labor rates apply for the warranty period of the component, unless otherwise noted Parts not otherwise listed carry a 90 day warranty from the date of installation.

Whenever practicable, IHP will provide replacement parts, if available, for a period of 10 years from the last date of manufacture of the Product.

IHP will not be responsible for: (a) damages caused by normal wear and tear, accident, riot, fire, flood or acts of God; (b) damages caused by abuse, negligence, misuse, or unauthorized alteration or repair of the Product affecting its stability or performance. (The Product must be subject to normal use with approved fuels listed in the Operation Manual provided with the product. Fuel products with abnormal burning characteristics, including but not limited to fuel such as driftwood, coal or plywood and wood products using a binder may burn at excessive temperatures and may cause damage to the Product or may cause it to function improperly; IHP stoves and inserts are approved for burning dry seasoned wood only.); (c) damages caused by failing to provide proper maintenance and service in accordance with the instructions provided with the Product; (d) damages, repairs or inefficiency resulting from faulty installation or application of the Product.

Coverage of this 5 Year Limited Warranty is conditional upon the appliance being operated without the use of grates, irons or any other method to elevate the fire.

IHP is not responsible for inadequate system draft caused by air conditioning and heating systems, mechanical ventilation systems, or general construction conditions which may generate negative air pressure in the room in which the appliance is installed. Additionally IHP assumes no responsibility for smoking conditions caused by inadequate chimney height, adjoining trees or buildings, adverse wind conditions or unusual environmental factors and conditions.

This 5 Year Limited Warranty covers only parts and labor as provided herein. In no case shall IHP be responsible for materials, components or construction which are not manufactured or supplied by IHP or for the labor necessary to install, repair or remove such materials, components or construction. Additional utility bills incurred due to any malfunction or defect in equipment are not covered by this 5 Year Limited Warranty. All replacement or repair components will be shipped F.O.B. from the nearest stocking IHP factory.

LIMITATION ON LIABILITY

It is expressly agreed and understood that IHP's sole obligation and the purchaser's exclusive remedy under this warranty, under any other warranty, expressed or implied, or in contract, tort or otherwise, shall be limited to replacement, repair, or refund, as specified herein.

In no event shall IHP be liable for any incidental or consequential damages caused by defects in the Product, whether such damage occurs or is discovered before or after replacement or repair, and whether such damage is caused by IHP's negligence. IHP has not made and does not make any representation or warranty of fitness for a particular use or purpose, and there is no implied condition of fitness for a particular use or purpose.

IHP makes no expressed warranties except as stated in this 5 Year Limited Warranty. The duration of any implied warranty is limited to the duration of this expressed warranty.

No one is authorized to change this 5 Year Limited Warranty or to create for IHP any other obligation or liability in connection with the Product. Some states and provinces do not allow the exclusion or limitation of incidental or consequential damages, so the above limitations or exclusions may not apply to you. The provisions of this 5 Year Limited Warranty are in addition to and not a modification of or subtraction from any statutory warranties and other rights and remedies provided by law.

INVESTIGATION OF CLAIMS AGAINST WARRANTY

IHP reserves the right to investigate any and all claims against this 5 Year Limited Warranty and to decide, in its sole discretion, upon the method of settlement.

To receive the benefits and advantages described in this 5 Year Limited Warranty, the appliance must be installed and repaired by a licensed contractor approved by IHP.

Contact IHP at the address provided herein to obtain a listing of approved dealers/distributors. **IHP shall in no event be responsible for any warranty work done by a contractor that is not approved without first obtaining IHP's prior written consent.**

HOW TO REGISTER A CLAIM AGAINST WARRANTY

In order for any claim under this warranty to be valid, you must contact the IHP dealer/distributor from which you purchased the product. If you cannot locate the dealer/distributor, then you must notify IHP in writing. IHP must be notified of the claimed defect in writing within 90 days of the date of failure. Notices should be directed to the IHP Warranty Department at 1769 East Lawrence Street; Russellville, AL 35654 or visit our website at WWW.SUPERIORFIREPLACES.US.COM.

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P/N 900232-00, Rev. B 02/2018

Innovative Hearth Products
1769 East Lawrence Street • Russellville, AL 35654

WARRANTY

Your wood appliance is covered by a limited warranty (provided with the appliance). Please read the warranty to be familiar with its coverage.

Retain this manual. File it with your other documents for future reference.

REPLACEMENT PARTS

See ***Page 23*** for a complete replacement parts list. Use only parts supplied from the manufacturer.

Normally, all parts should be ordered through your IHP distributor or dealer. Parts will be shipped at prevailing prices at time of order.

When ordering repair parts, always give the following information:

1. The model number of the appliance.
2. The Serial Number of the appliance.
3. The part number.
4. The description of the part.
5. The quantity required.
6. The installation date of the appliance.

If you encounter any problems or have any questions concerning the installation or application of this system, please contact your dealer.

Innovative Hearth Products
1769 East Lawrence Street
Russellville, AL 35654
SuperiorFireplaces.us.com

PRODUCT REFERENCE INFORMATION

We recommend that you record the following important information about your appliance. If you did not purchase your appliance directly from an IHP dealer, then contact us at SuperiorFireplaces.us.com to find your nearest IHP dealer who will answer your questions or address your concerns.

Model Number _____

Serial Number _____

Date Installed _____

Your Dealer's Name _____

NATIONAL FIREPLACE INSTITUTE NFI CERTIFIED www.nficertified.org

We recommend that our woodburning hearth products be installed and serviced by professionals who are certified in the U.S. by the National Fireplace Institute® (NFI) as NFI Woodburning Specialists or who are certified in Canada by Wood Energy Technical Training (WETT).

Wood Energy Technical Training www.wettinc.ca

Innovative Hearth Products (IHP) reserves the right to make changes at any time, without notice, in design, materials, specifications, and prices, and also to discontinue colors, styles, and products. Consult your local distributor for fireplace code information.

INNOVATIVE HEARTH PRODUCTS

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P900979-00

TS 210 Test Setting Recommendations

Start up and Kindling

Combined weight of the startup fuel and kindling should be between 8.0-8.5 pounds. Heavier and bigger pieces should be on the bottom while lighter and smaller pieces are on top.

To start the load, use a propane torch for 1 minute lighting the top pieces. Close door to the unit once one minute is up.

High Burn

It is recommended that high burn is tested using Douglas Fir lumber loaded in a north to south orientation to the Unit.

High burn should be loaded at the bottom of the allowable residual fuel weight. The door should be closed immediately after load.

The Convection air fan may be turned on to its high setting once 650 degrees (F) has been reached.

Low/Medium Burn

It is recommended that the low/medium burn is tested using Maple lumber loaded in a north to south orientation to the unit.

Low/Medium Burn should be loaded towards the bottom of their respective coal bed weights. The door should be closed immediately after the load

After load primary air control should be set to high for 15 minutes or until 15% of the fuel load has been consumed, whichever comes first, at which point the primary air control is set to its natural low stop point.

The Convection air fan may be turned on to its high setting once the unit has begun tailing and there is no more flame in the fire box.

WOOD HEATER TESTING SUMMARY

SECTION 1 – Model Identification

Model Name(s)/Number(s)	S210AGL, C210TGL, C210AGL, T2100GL, WXS2021WS-B
Manufacturer	Innovative Hearth Products
Address 1	1502 14th St. NW
Address 2	Auburn, WA 98001
Appliance Category(s) (Free-standing, Insert, etc.)	Free-standing
Usable Firebox Volume - ft^3	2.12
Catalytic/Non-Cat	Non-Cat
Convection Air Fan (No, Standard, Optional)	Optional

SECTION 1B – Laboratory Information

Testing Laboratory	PFS-TECO
Address 1	11785 SE Hwy 212 Ste 305
Address 2	Clackamas, OR 97015
ISO/Accreditation Info	ISO 17025
Dates Tested	4/10/19 - 4/11/19
Test Methods/Standards	ASTM E3053 (ALT-125), ASTM E2515
Dilution Tunnel Inside Diameter - in.	6.00
Fliter Diameter - mm	47
Filter Material	Pall Type TX40

Test Configuration Photographs



Stove Front



Stove Left



Stove Right



Typical Kindling Load



Typical Start-up Load



Typical High Fire Load



Typical High Fire Coal Bed



Typical Low/Med Fire Load



Typical Low Fire Coal Bed

SECTION 2 – Test Conditions Summary

Model Name(s)/Number(s)	S210AGL, C210TGL, C210AGL, T2100GL, WXS2021WS-B			
Usable Firebox Volume - ft^3	2.12			
Convection Air Fan (No, Standard, Optional)	Optional			
Test Run #	3	2	4	
Date Tested	4/11/2019	4/10/2019	4/11/2019	
Test Run Category (L, M, H)	H	L	M	
Average Barometric Pressure - in Hg	29.72	29.91	29.66	
Max. Observed Ambient Temp - °F	78	77	79	
Min. Observed Ambient Temp - °F	58	64	66	
Max. Observed Filter Temp - °F	90	90	89	
Test Run Air Settings				
Primary (measured up from minimum)	Maximum	Minimum	0.25"	
Secondary (measured up from minimum)	Fixed	Fixed	Fixed	
Convection Air Fan Setting	Off	Off	Off	
Test Fuel Load				
Cordwood Fuel Species	Maple	Maple	Maple	
Specific Gravity (from Table 1)	0.6	0.6	0.6	
Higher Heating Value - Btu/lb (from Annex A1)	8587	8587	8587	
Nom. Test Fuel Load Piece Length - in.	15	15	15	
Number of Test Fuel Pieces	5	6	6	
Test Fuel Weight				
Kindling - As Fired lb	3.29	na	na	
Kindling Wt. - As % of Test Fuel Load	15%	na	na	
Kindling Moisture - % DB	10%	na	na	
Kindling - kg DB	1.36	na	na	
SU Fuel - As Fired lb	4.88	na	na	
SU Fuel Wt. - As % of Test Fuel Load	22%	na	na	
SU Fuel Moisture - % DB	23%	na	na	
SU Fuel - kg DB	1.79	na	na	
Test Fuel Load - As Fired lb	21.79	24.33	24.37	
Ave. Test Fuel Load MC % DB	19.1%	20.4%	19.9%	
Test Fuel Load - kg DB	8.30	9.19	9.22	
Test Fuel Loading Density - lb/ft^3	10.28	11.48	11.50	
Residual SU Fuel Wt. - As Fired lb	2.20	na	na	
Residual SU Fuel Wt. - As % of Test Fuel Load	10%	na	na	
Test Run Duration - minutes	186	606	633	
Test Run Duration - h	3.10	10.10	10.55	
Run Duration of High Fire Load Only - minutes	150	na	na	
Run Duration of High Fire Load Only - h	2.50	na	na	
Test Fuel Load Wt. at End of Test - As Fired lb	2.4	0	0	
Total Total Fuel Burned - kg DB	9.36	9.19	9.22	
% Test Fuel Load Wt. at End of Test	11.0%	0.0%	0.0%	

SECTION 3 – Test Run Results Summary

Model Name(s)/Number(s)	S210AGL, C210TGL, C210AGL, T2100GL, WXS2021WS-B			
Usable Firebox Volume - ft^3	2.12			
Convection Air Fan (No, Standard, Optional)	Optional			
Test Run #	3	2	4	
Date Tested	4/11/19	4/10/19	4/11/19	
Test Run Category	H	L	M	
Burn Rate - kg/h DB	2.88	0.91	0.87	
Burn Rate - As % of Low to High Midpoint	na	na	47%	
Burn Duration - h	3.10	10.10	10.55	
Heat Output - Btu/h	37,857	12,253	11,817	
Average Dilution Tunnel Flow Rate - dscfm	179.6	184.2	185.2	
Average Sample Flow Rates - dscfm				
Train 1	0.179	0.181	0.184	
Train 2	0.173	0.177	0.178	
Total PM Emissions - g				
Train 1	10.53	6.94	15.92	
Train 2	9.76	6.48	17.62	
Average	10.145	6.710	16.770	
PM Emission Train Precision - %	3.8%	3.4%	-5.1%	
PM Emission Train Precision - g/kg	0.08	0.05	-0.18	
PM Emission Rate - g/h	3.27	0.66	1.59	
Total CO Emissions - g	237	853	944	
CO Emissions Rate - g/h	95	84	89	
Overall Efficiency - CSA B415.1-10				
% HHV Basis	69.2	71.7	71.3	
% LHV Basis	74.8	76.6	76.3	

SECTION 4 - Weighted Average Summary

Model Name(s)/Number(s)	S210AGL, C210TGL, C210AGL, T2100GL, WXS2021WS-B		
Usable Firebox Volume - ft_3	2.12		
Convection Air Fan (No, Standard, Optional)	Optional		
Average for Each Test Run Category	L	M	H
Burn Rate - kg/h DB	0.91	0.87	2.88
PM Emission Rate - g/h	0.66	1.59	3.27
CO Emissions Rate - g/h	84.5	89.5	94.8
Overall Efficiency - CSA B415.1-10			
% HHV Basis	71.7	71.3	69.2
% LHV Basis	76.6	76.3	74.8
Heat Output - Btu/h	12300	11800	37900
Category Weighting	40%	40%	20%

ASTM E 3053 Weighted Averages			
PM Emission Rate - g/h	1.6		
CO Emissions Rate - g/h	88.5		
Overall Efficiency - CSA B415.1-10			
% HHV Basis	71.0		
% LHV Basis	76.1		
Heat Output Range - Btu/h	11800	to	37900

Conditioning Data

Client:	IHP	Job #:	19-468
Model:	ST210GL	Tracking #:	0026
Date(s):		Technician:	SJB

		Average:	313.5	71.5	N/A
Elapsed Time (hrs)	**Scale Reading (lbs)**	**Weight Change (lbs)**	**Flue (°F)**	**Ambient (°F)**	**Catalyst Exit (°F)**
0	23.0	-	345	74	N/A
1	13.3	-9.7	369	76	N/A
2	7.0	-6.3	343	76	N/A
3	4.5	-2.5	188	74	N/A
4	3.5	-1.0	161	72	N/A
5	21.8	18.3	333	65	N/A
6	10.5	-11.3	587	75	N/A
7	3.9	-6.6	365	74	N/A
8	22.2	18.3	378	63	N/A
9	7.9	-14.3	572	76	N/A
10	22.9	15.0	341	72	N/A
11	13.1	-9.8	379	72	N/A
12	7.1	-6.0	319	70	N/A
13	4.4	-2.7	219	68	N/A
14	3.6	-0.8	189	67	N/A
15	2.7	-0.9	179	66	N/A
16	22.6	19.9	391	64	N/A
17	7.4	-15.2	581	77	N/A
18	25.9	18.5	317	67	N/A
19	18.6	-7.3	376	65	N/A
20	11.9	-6.7	355	71	N/A
21	7.9	-4.0	230	69	N/A
22	6.7	-1.2	193	66	N/A
23	6.0	-0.7	185	66	N/A
24	5.1	-0.9	184	66	N/A
25	4.6	-0.5	176	66	N/A
26	3.7	-0.9	168	66	N/A
27	21.5	17.8	365	69	N/A
28	8.9	-12.6	572	76	N/A
29	24.0	15.1	264	73	N/A
30	15.0	-9.0	429	79	N/A
31	8.3	-6.7	339	73	N/A
32	5.1	-3.2	237	70	N/A
33	21.6	16.5	454	66	N/A
34	5.8	-15.8	453	78	N/A
35	26.0	20.2	272	72	N/A
36	15.4	-10.6	381	74	N/A
37	9.4	-6.0	317	73	N/A
38	7.2	-2.2	209	74	N/A
39	6.3	-0.9	154	72	N/A
40	5.4	-0.9	142	70	N/A
41	23.3	17.9	384	71	N/A
42	11.7	-11.6	539	75	N/A
43	5.2	-6.5	454	77	N/A
44	23.6	18.4	338	76	N/A
45	16.4	-7.2	351	77	N/A
46	10.3	-6.1	329	78	N/A
47	7.7	-2.6	162	75	N/A
48	6.5	-1.2	145	73	N/A
49	5.3	-1.2	140	71	N/A
50	4.3	-1.0	134	70	N/A

Signature/Date:  4/10/2019

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
RESEARCH TRIANGLE PARK, NC 27711

FEB 2 8 2018

OFFICE OF
AIR QUALITY PLANNING
AND STANDARDS

Mr. Justin White
Hearthstone QHPP, Inc.
#17 Stafford Ave.
Morrisville, VT 05661

Dear Mr. White,

I am writing in response to your letter dated January 12, 2018, regarding wood heaters manufactured by Hearthstone QHPP, Inc. (Hearthstone). This response, dated February 28, 2018, supercedes our previous response (dated February 26, 2018) to correct an inaccuracy regarding required changes to ASTM E3053-17.

You are requesting to use an alternative test method, using cord wood, as referenced in section 60.532(c) of 40 CFR part 60, Subpart AAA, Standards of Performance for New Residential Wood Heaters (Subpart AAA) to meet the 2020 cord wood alternative compliance option. The 2020 cord wood alternative compliance option states that each affected wood heater manufactured or sold at retail for use in the United States on or after May 15, 2020, must not discharge into the atmosphere any gases that contain particulate matter in excess of 2.5 g/hr. Compliance must be determined by a cord wood test method approved by the Administrator along with the procedures in 40 CFR 60.534. You have requested approval to use the procedures and specifications found in ASTM Method E3053-17, a cord wood test method titled, "Standard Test Method for Determining Particulate Matter Emissions from Wood Heaters using Cordwood Test Fuel," in conjunction with ASTM E2515-11 and Canadian Standards Administration (CSA) Method CSA-B415.1-10, which are specified in 40 CFR 60.534.

We understand that Hearthstone is also requesting that the alternative method proposed above be approved to apply broadly to all wood heaters manufactured by Hearthstone meeting the requirements of Subpart AAA, from the approval date of this request until such time that Subpart AAA is revised or replaced to require a different cord wood certification method, providing all requirements of section 60.533 of Subpart AAA are met.

With the caveats set forth below, we approve your alternative test method request for certifying wood heaters using ASTM E3053-17 in conjunction with section 60.534 of Subpart AAA to meet the 2020 cord wood compliance option until such time that Subpart AAA is revised or replaced to require a different cord wood certification method. We also approve application of this alternative method to all wood heaters manufactured by Hearthstone meeting the requirements of Subpart AAA.

As required in Subpart AAA, section 60.354(d), you or your approved test laboratory must also measure the first hour of particulate matter emissions for each test run using a separate filter in one of the two parallel sampling trains. These results must be reported separately and also included in the total particulate matter emissions per run. Also, as required by Subpart AAA, section 60.534(e), you must have your approved laboratory measure the efficiency, heat output, and carbon monoxide emissions of the tested wood heater using CSA-B415.1-10. For measurement of particulate matter emission concentrations, ASTM 2515-11 must be used.

The following change to ASTM E3053-17 must be followed:

1. Coal bed conditions prior to loading test fuel. The coal bed shall be a level plane without valleys or ridges for all test runs in the high, low, and medium burn rate categories.

The following changes to ASTM E2515-11 must be followed:

1. The filter temperature must be maintained between 80 and 90 degrees F during testing.

2. Filters must be weighed in pairs to reduce weighing error propagation; see ASTM 2515-11, Section 10.2.1 Analytical Procedure.

3. Sample filters must be Pall TX-40 or equivalent Teflon-coated glass fiber, and of 47 mm, 90 mm, 100 mm, or 110 mm in diameter.

4. Only one point is allowed outside the +/- 10 percent proportionality range per test run.

A copy of this letter must be included in each certification test report where this alternative test method is utilized.

It is reasonable that this alternative test method approval be broadly applicable to all wood heaters subject to the requirements of 40 CFR part 60, Subpart AAA. For this reason, we will post this letter as ALT-125 on our website at *http://www3.epa.gov/ttn/emc/approalt.html* for use by other interested parties. As noted earlier in this letter, this alternative method approval is valid until such time that Subpart AAA is revised or replaced to require a different cord wood certification method, and at such time, this alternative will be reconsidered and possibly withdrawn.

If you have additional questions regarding this approval, please contact Michael Toney of my staff at 919-541-5247 or toney.mike@epa.gov.

Sincerely,

Steffan M. Johnson, Group Leader
Measurement Technology Group

cc: Amanda Aldridge, EPA/OAQPS/OID
Adam Baumgart-Getz, EPA/OAQPS/OID
Rafael Sanchez, EPA/OECA
Michael Toney, EPA/OAQPS/AQAD

Sample Calculations – ASTM E3053 & E2515

Client: IHP
Model: ST210GL
Run: 3

Equations used to calculate the parameters listed below are described in this appendix. Sample calculations are provided for each equation. The raw data and printout results from a sample run are also provided for comparison to the sample calculations.

M_{Fldb} – Weight of test fuel load, dry basis, lb (kg)

M_{SUdb} – Weight of start-up fuel, dry basis, lb (kg)

M_{Kdb} - Weight of kindling, dry basis, lb (kg)

M_{FREHdb} - Total weight of all remaining fuel at end of high fire test run, lb (kg)

M_{TFBHdb} - Total weight of all fuel burned during high fire test run, lb (kg), dry basis

BR_H – Dry burn rate for high fire test run, from time when test fuel load is added to end of test run, lb/h (kg/h)

M_{TFBdb} - Total weight of fuel burned during low or medium fire test run, lb (kg), dry basis

BR - Dry burn rate for low and medium fire test runs, lb/h (kg/h)

V_s – Average gas velocity in the dilution tunnel, ft/sec

Q_{sd} – Average gas flow rate in dilution tunnel, dscf/hr

$V_{m(std)}$ – Volume of gas sampled, corrected to dry standard conditions, dscf

m_n – Total particulate matter collected, mg

C_s - Concentration of particulate matter in tunnel gas, dry basis, corrected to STP, g/dscf

E_T – Total particulate emissions, g

PR - Proportional rate variation

PM_{RH} - Particulate emission rate for high fire test run, g/hr

PM_{FH} - Particulate emission factor for high fire test run, g/dry kg of fuel burned

PM_R – Particulate emission rate for low or medium fire test run, g/hr

PM_F – Particulate emission factor for low or medium fire test run, g/dry kg of fuel burned

M_{Fldb} – Weight of test fuel load, dry basis, lb (kg)
ASTM E3053 equation (1)

$$M_{Fldb} = \Sigma((M_{FLnwb})(100/(100 + MC_{FLn})))$$

Where,

M_{FLnwb} = Weight of each test fuel piece, n, in test fuel load per 8.4.1, wet basis, lb (kg)
MC_{FLn} = Average fuel moisture of test fuel piece, n, in test fuel load, % dry basis
n = individual test fuel pieces that comprise the test fuel load, as applicable.

Sample Calculation:

n	M_{FLnwb}	MC_{FLn}	$(M_{FLnwb})(100/(100 + MC_{FLn}))$		
1	5.25	18.7	5.25 (100) / (100+ 18.7)) =	4.42	
2	3.40	19.3	3.4 (100) / (100+ 19.3)) =	2.85	
3	4.88	18.3	4.88 (100) / (100+ 18.3)) =	4.13	
4	3.05	21.9	3.05 (100) / (100+ 21.9)) =	2.50	
5	5.15	18.5	5.15 (100) / (100+ 18.5)) =	4.34	
6	0.00	NA	N/A	-	
7	N/A	N/A	N/A	-	
			SUM	18.25	lbs

M_{Fldb} = **18.25** lbs
M_{Fldb} = **8.28** kg

M_{SUdb} – Weight of start-up fuel, dry basis, lb (kg)
ASTM E3053 equation (2)

$$M_{SUdb} = (M_{SUwb})(100/(100 + MC_{SU}))$$

Where,

M_{SUwb} = Total weight of start-up fuel pieces, wet basis, lb (kg)

MC_{SU} = Average fuel moisture of the piece(s) from which start-up fuel was split, % dry basis

Sample Calculation:

M_{SUwb} = 4.88

MC_{SU} = 23.4

M_{SUdb} = 4.9 (100/(100+ 23.4)

M_{SUdb} = **3.95** lbs

= **1.79** kg

M_{Kdb} - Weight of kindling, dry basis, lb (kg)
ASTM E3053 equation (3)

$$M_{Kdb} = (M_{Kwb})(100/(100 + MC_K))$$

Where,

M_{Kwb} = Weight of kindling per 8.5.6, wet basis, lb (kg);

MC_K = Average moisture of kindling (may be assumed 10%), % dry basis.

Sample calculation:

M_{Kwb} = 3.29

MC_K = 10.0

M_{Kdb} = 3.29 (100/(100+ 10.0)

M_{Kdb} = **2.99** lbs

= **1.36** kgs

M_{FREHdb} - Total weight of all remaining fuel at end of high fire test run, lb (kg)
ASTM E3053 equation (4)

$$M_{FREHdb} = M_{RSUBdb} + M_{FLEHdb}$$

Where,

M_{RSUBdb} = Weight of residual start-up fuel bed when high fire test load added, lb (kg)

M_{FLEHdb} = Weight of unburned portion of test fuel load at the end of the high fire test run, lb (kg)

Sample calculation:

M_{RSUBdb} = 2.2

M_{FLEHdb} = 2.39

M_{FREHdb} = 2.20 + 2.39

M_{FREHdb} = **4.59** lbs

= **2.08** kg

M_{TFBHdb} - Total weight of all fuel burned during high fire test run, lb (kg), dry basis

ASTM E3053 equation (5)

$$M_{TFBHdb} = M_{Kdb} + M_{SUdb} + M_{FLdb} - M_{FREHdb}$$

Sample Calculation:

M_{Kdb} = 2.99

M_{SUdb} = 3.95

M_{FLdb} = 18.25

M_{FREHdb} = 4.59

M_{TFBHdb} = 2.99 + 3.95 + 18.25 - 4.59

= **20.60** lbs

= **9.34** kg

BR_H – Dry burn rate for high fire test run, from time when test fuel load is added to end of test run, lb/h (kg/h)

ASTM E3053 equation (6)

$$BR_H = 60 (M_{FLdb} - M_{FLEHdb})/\theta_{H1}$$

Where,

θ_{H1} = Total duration of high fire test run, from time when test fuel load is added to end of test run, min.

Sample calculation:

M_{FLdb} = 18.25

M_{FLEHdb} = 2.39

θ_{H1} = 150

$$BR_H = \frac{60 (18.25 - 2.39)}{150}$$

BR_H = **6.34** lb/hr

= **2.88** kg/hr

M_{TFBdb} - Total weight of fuel burned during low or medium fire test run, lb (kg), dry basis
ASTM E3053 equation (7)

$$M_{TFBdb} = M_{FLdb} - M_{FREdb}$$

Where,

M_{FLdb} = Total weight of fuel burned during low or medium fire test run, lb (kg), dry basis

M_{FREdb} = Weight of remaining fuel at end of low or medium fire test run, lb (kg)

Sample Calculation:

M_{FLdb} = N/A - Applicable to Low/Medium Fire Tests Only

M_{FREdb} = N/A - Applicable to Low/Medium Fire Tests Only

M_{TFBdb} = N/A - N/A

= **N/A** lbs

= **N/A** kg

BR - Dry burn rate for low and medium fire test runs, lb/h (kg/h)
ASTM E3053 equation (8)

$$BR = \frac{60\ M_{TFBdb}}{\theta}$$

Where,

θ = Total test run duration for low or medium fire test run, min.

Sample Calculation:

M_{TFBdb} = N/A - Applicable to Low/Medium Fire Tests Only

θ = N/A - Applicable to Low/Medium Fire Tests Only

$$BR = \frac{60 \times \text{N/A}}{\text{N/A}}$$

BR = **N/A** lb/hr

= **N/A** kg/hr

V_s – Average gas velocity in the dilution tunnel, ft/sec
ASTM E2515 equation (9)

$$v_s = F_P \times k_p \times C_p \times (\sqrt{\Delta P})_{avg} \times \sqrt{\frac{T_{s(avg)}}{P_s \times M_s}}$$

Where:

F_p = Adjustment factor for pitot tube center point reading = $\frac{V_{strav}}{V_{scent}}$, ASTM E2515 Equation (1)

v_{scent} = Dilution tunnel velocity calculated after the multi-point pitot traverse at the center, ft/sec

v_{strav} = Dilution tunnel velocity calculated after the multi-point pitot traverse, ft/sec

k_p = Pitot tube constant, 85.49

C_p = Pitot tube coefficient: 0.99, unitless

ΔP* = Velocity pressure in the dilution tunnel, in H_2O

T_s = Absolute average gas temperature in the dilution tunnel, °R; (°R = °F + 460)

P_s = Absolute average gas static pressure in dilution tunnel, = $P_{bar} + P_g$, in Hg

P_{bar} = Barometric pressure at test site, in. Hg

P_g = Static pressure of tunnel, in. H_20; (in Hg = in H_20/13.6)

M_s = **The dilution tunnel wet molecular weight; M_s = 28.78 assuming a dry weight of 29 lb/lb-mole

Sample calculation:

$$Fp = \frac{16.22}{17.46} = 0.929$$

$$V_s = 0.929 \times 85.49 \times 0.99 \times 0.265 \times \left(\frac{115.2 + 460}{\left(29.72 + \frac{-0.30}{13.6}\right) \times 28.78} \right)^{1/2}$$

V_s = **17.07** ft/s

*The ASTM test standard mistakenly has the square root of the average delta p instead of the average of the square root of delta p. The current EPA Method 2 is also incorrect. This was verified by Mike Toney at EPA.

**The ASTM test standard mistakenly identifies Ms as the dry molecular weight. It should be the wet molecular weight as indicated in EPA Method 2.

Q_{sd} – Average gas flow rate in dilution tunnel, dscf/hr
ASTM E2515 equation (3)

$$Q_{sd} = 3600 \times (1 - B_{ws}) \times v_s \times A \times \frac{T_{std}}{T_{s(avg)}} \times \frac{P_s}{P_{std}}$$

Where:

3600	=	Conversion from seconds to hours (ASTM method uses 60 to convert in minutes)
B_{ws}	=	Water vapor in gas stream, proportion by volume; assume 2%
A	=	Cross sectional area of dilution tunnel, ft^2
T_{std}	=	Standard absolute temperature, 528 °R
P_s	=	Absolute average gas static pressure in dilution tunnel, = P_{bar} + P_g , in Hg
$T_{s(avg)}$	=	Absolute average gas temperature in the dilution tunnel, °R; (°R = °F + 460)
P_{std}	=	Standard absolute pressure, 29.92 in Hg

Sample calculation:

$$Q_{sd} = 3600 \times (1 - 0.02) \times 17.07 \times 0.1963 \times \frac{528}{115.2 + 460} \times \frac{29.72 + \frac{-0.30}{13.6}}{29.92}$$

Q_{sd} = **10774.1** dscf/hr

$V_{m(std)}$ – Volume of Gas Sampled Corrected to Dry Standard Conditions, dscf
ASTM E2515 equation (6)

$$V_{m(std)} = K_1 V_m Y \frac{P_{bar} + \frac{\Delta H}{13.6}}{T_m}$$

Where:

K_1	=	17.64 °R/in. Hg
V_m	=	Volume of gas sample measured at the dry gas meter, dcf
Y	=	Dry gas meter calibration factor, dimensionless
P_{bar}	=	Barometric pressure at the testing site, in. Hg
ΔH	=	Average pressure differential across the orifice meter, in. H_2O
T_m	=	Absolute average dry gas meter temperature, °R

Sample Calculation:

Using equation for Train 1:

$$V_{m(std)} = 17.64 \times 33.248 \times 0.986 \times \frac{\left(29.72 + \frac{0.39}{13.6}\right)}{(71.8 + 460)}$$

$V_{m(std)}$ = **32.347** dscf

Using equation for Train 2:

$$V_{m(std)} = 17.64 \times 32.259 \times 1.004 \times \frac{\left(29.72 + \frac{0.40}{13.6}\right)}{(68.6 + 460)}$$

$V_{m(std)}$ = **32.152** dscf

Using equation for ambient train:

$$V_{m(std)} = 17.64 \times 0.00 \times 1 \times \frac{\left(29.72 + \frac{0.00}{13.6}\right)}{(70.9 + 460)}$$

$V_{m(std)}$ = **0** dscf

m_n – Total Particulate Matter Collected, mg
ASTM E2515 Equation (12)

$$m_n = m_p + m_f + m_g$$

Where:

m_p = mass of particulate matter from probe, mg

m_f = mass of particulate matter from filters, mg

m_g = mass of particulate matter from filter seals, mg

Sample Calculation:

Using equation for Train A (first hour):

m_n = 0.0 + 5.1 + 0.0

m_n = 5.1 mg

Using equation for Train A (post-first hour):

m_n = 0.7 + 3.2 + 1.2

m_n = 5.1 mg

Train A aggregate:

m_n = 5.1 + 5.1

m_n = **10.2** mg

Using equation for Train B:

m_n = 0.5 + 7.7 + 1.2

m_n = **9.4** mg

C_s - Concentration of particulate matter in tunnel gas, dry basis, corrected to STP, g/dscf
ASTM E2515 equation (13)

$$C_s = K_2 \times \frac{m_n}{V_{m(std)}}$$

Where:

K_2	=	Constant, 0.001 g/mg
m_n	=	Total mass of particulate matter collected in the sampling train, mg
$V_{m(std)}$	=	Volume of gas sampled corrected to dry standard conditions, dscf

Sample calculation:

For Train 1:

$$C_s = 0.001 \times \frac{10.2}{32.35}$$

$C_s =$ **0.00032** g/dscf

For Train 2

$$C_s = 0.001 \times \frac{9.4}{32.15}$$

$C_s =$ **0.00029** g/dscf

For Ambient Train

$$C_r = 0.001 \times \frac{0.0}{0}$$

$C_r =$ **0** g/dscf

E_T – Total Particulate Emissions, g
ASTM E2515 equation (15)

$$E_T = (c_s - c_r) \times Q_{std} \times \theta$$

Where:

C_s	=	Concentration of particulate matter in tunnel gas, g/dscf
C_r	=	Concentration particulate matter room air, g/dscf
Q_{std}	=	Average dilution tunnel gas flow rate, dscf/hr
θ	=	Total time of test run, minutes

Sample calculation:

For Train 1

E_T = (0.000315 - 0) x 10774.1 x 186 /60

E_T = **10.53** g

For Train 2

E_T = (0.000292 - 0) x 10774.1 x 186 /60

E_T = **9.76** g

Average

E = **10.15** g

Total emission values shall not differ by more than 7.5% from the total average emissions

7.5% of the average =	0.76
Train 1 difference =	0.38
Train 2 difference =	0.38

PR - Proportional Rate Variation

ASTM E2515 equation (16)

$$PR = \left[\frac{\theta \times V_{mi} \times V_s \times T_m \times T_{si}}{\theta_i \times V_m \times V_{si} \times T_{mi} \times T_s} \right] \times 100$$

Where:

θ = Total sampling time, min

θ_i = Length of recording interval, min

V_{mi} = Volume of gas sample measured by the dry gas meter during the “ith” time interval, dcf

V_m = Volume of gas sample as measured by dry gas meter, dcf

V_{si} = Average gas velocity in the dilution tunnel during the "ith" time interval, ft/sec

V_s = Average gas velocity in the dilution tunnel, ft/sec

T_{mi} = Absolute average dry gas meter temperature during the "ith" time interval, ^oR

T_m = Absolute average dry gas meter temperature, ^oR

T_{si} = Absolute average gas temperature in the dilution tunnel during the "ith" time interval, ^oR

T_s = Absolute average gas temperature in the dilution tunnel, ^oR

Sample calculation (for the first 1 minute interval of Train 1):

$$PR = \left(\frac{186 \times 0.179 \times 17.07 \times (79.0 + 460) \times (71.8 + 460)}{1 \times 33.248 \times 16.52 \times (115.2 + 460) \times (62.0 + 460)} \right) \times 100$$

PR = **99** %

PM_{RH} - Particulate emission rate for high fire test run, g/hr;
ASTM E3053 equation (9)

$$PM_{RH} = 60(E_{TH}/\theta_{H2})$$

Where,

E_{TH} = Total particulate emissions for high fire test run including kindling and start-up, g

θ_{H2} = Total duration of high fire test run, from ignition of kindling to end of test run, min.

Sample Calculation:

E_{TH} = 10.15

θ_{H2} = 186

PM_{RH} = 60(10.15 / 186)

PM_{RH} = **3.27** g/hr

PM_{FH} - Particulate emission factor for high fire test run, g/dry kg of fuel burned.

ASTM E3053 equation (10)

$$PM_{FH} = E_{TH}/M_{TFBHdb}$$

Sample Calculation:

E_{TH} = 10.15

M_{TFBHdb} = 9.34

PM_{FH} = 10.15 / 9.34

= **1.09** g/kg

PM_R - Particulate emission rate for low or medium fire test runs, g/hr
ASTM E3053 equation (12)

$$PM_R = 60(E_T/\theta)$$

Where,

E_T = Total particulate emissions for low or medium fire test runs from Test Method E2515, g

Sample Calculation:

E_T = N/A - Applicable to Low/Medium Fire Tests Only
θ = N/A - Applicable to Low/Medium Fire Tests Only

PM_R = 60(N/A / N/A)

PM_{RH} = **N/A** g/hr

PM_{FH} - Particulate emission factor for high fire test run, g/dry kg of fuel burned.
ASTM E3053 equation (13)

$$PM_F = E_T/M_{TFBdb}$$

Sample Calculation:

E_T = N/A - Applicable to Low/Medium Fire Tests Only
M_{TFBdb} = N/A - Applicable to Low/Medium Fire Tests Only

PM_{FH} = N/A / N/A
= **N/A** g/kg

Sample Calculations – ASTM E3053 & E2515

Client: IHP
Model: ST210GL
Run: 2

Equations used to calculate the parameters listed below are described in this appendix. Sample calculations are provided for each equation. The raw data and printout results from a sample run are also provided for comparison to the sample calculations.

M_{Fldb} – Weight of test fuel load, dry basis, lb (kg)

M_{SUdb} – Weight of start-up fuel, dry basis, lb (kg)

M_{Kdb} - Weight of kindling, dry basis, lb (kg)

M_{FREHdb} - Total weight of all remaining fuel at end of high fire test run, lb (kg)

M_{TFBHdb} - Total weight of all fuel burned during high fire test run, lb (kg), dry basis

BR_H – Dry burn rate for high fire test run, from time when test fuel load is added to end of test run, lb/h (kg/h)

M_{TFBdb} - Total weight of fuel burned during low or medium fire test run, lb (kg), dry basis

BR - Dry burn rate for low and medium fire test runs, lb/h (kg/h)

V_s – Average gas velocity in the dilution tunnel, ft/sec

Q_{sd} – Average gas flow rate in dilution tunnel, dscf/hr

$V_{m(std)}$ – Volume of gas sampled, corrected to dry standard conditions, dscf

m_n – Total particulate matter collected, mg

C_s - Concentration of particulate matter in tunnel gas, dry basis, corrected to STP, g/dscf

E_T – Total particulate emissions, g

PR - Proportional rate variation

PM_{RH} - Particulate emission rate for high fire test run, g/hr

PM_{FH} - Particulate emission factor for high fire test run, g/dry kg of fuel burned

PM_R – Particulate emission rate for low or medium fire test run, g/hr

PM_F – Particulate emission factor for low or medium fire test run, g/dry kg of fuel burned

M_{Fldb} – Weight of test fuel load, dry basis, lb (kg)
ASTM E3053 equation (1)

$$M_{Fldb} = \Sigma((M_{FLnwb})(100/(100 + MC_{FLn})))$$

Where,

M_{FLnwb} = Weight of each test fuel piece, n, in test fuel load per 8.4.1, wet basis, lb (kg)
MC_{FLn} = Average fuel moisture of test fuel piece, n, in test fuel load, % dry basis
n = individual test fuel pieces that comprise the test fuel load, as applicable.

Sample Calculation:

n	M_{FLnwb}	MC_{FLn}	$(M_{FLnwb})(100/(100 + MC_{FLn}))$		
1	4.31	21.4	4.31 (100) / (100+ 21.4)) =	3.55	
2	4.37	19.7	4.37 (100) / (100+ 19.7)) =	3.65	
3	3.84	21.0	3.84 (100) / (100+ 21)) =	3.17	
4	4.64	19.6	4.644 (100) / (100+ 19.6)) =	3.88	
5	2.90	18.7	2.904 (100) / (100+ 18.7)) =	2.45	
6	4.26	21.6	4.26 (100) / (100+ 21.6)) =	3.50	
7	0.00		N/A	-	
			SUM	20.21	lbs

M_{Fldb} = **20.21** lbs
M_{Fldb} = **9.17** kg

M_{SUdb} – Weight of start-up fuel, dry basis, lb (kg)
ASTM E3053 equation (2)

$$M_{SUdb} = (M_{SUwb})(100/(100 + MC_{SU}))$$

Where,

M_{SUwb} = Total weight of start-up fuel pieces, wet basis, lb (kg)

MC_{SU} = Average fuel moisture of the piece(s) from which start-up fuel was split, % dry basis

Sample Calculation:

M_{SUwb} = N/A - Applicable to High Fire Tests Only

MC_{SU} = N/A - Applicable to High Fire Tests Only

M_{SUdb} = N/A (100/(100+ N/A)

M_{SUdb} = **N/A** lbs

= **N/A** kg

M_{Kdb} - Weight of kindling, dry basis, lb (kg)
ASTM E3053 equation (3)

$$M_{Kdb} = (M_{Kwb})(100/(100 + MC_K))$$

Where,

M_{Kwb} = Weight of kindling per 8.5.6, wet basis, lb (kg);

MC_K = Average moisture of kindling (may be assumed 10%), % dry basis.

Sample calculation:

M_{Kwb} = N/A - Applicable to High Fire Tests Only

MC_K = N/A - Applicable to High Fire Tests Only

M_{Kdb} = N/A (100/(100+ N/A)

M_{Kdb} = **N/A** lbs

= **N/A** kgs

M_{FREHdb} - Total weight of all remaining fuel at end of high fire test run, lb (kg)
ASTM E3053 equation (4)

$$M_{FREHdb} = M_{RSUBdb} + M_{FLEHdb}$$

Where,

M_{RSUBdb} = Weight of residual start-up fuel bed when high fire test load added, lb (kg)

M_{FLEHdb} = Weight of unburned portion of test fuel load at the end of the high fire test run, lb (kg)

Sample calculation:

M_{RSUBdb} = N/A - Applicable to High Fire Tests Only

M_{FLEHdb} = N/A - Applicable to High Fire Tests Only

M_{FREHdb} = N/A + N/A

M_{FREHdb} = **N/A** lbs

= **N/A** kg

M_{TFBHdb} - Total weight of all fuel burned during high fire test run, lb (kg), dry basis

ASTM E3053 equation (5)

$$M_{TFBHdb} = M_{Kdb} + M_{SUdb} + M_{FLdb} - M_{FREHdb}$$

Sample Calculation:

M_{Kdb} = N/A

M_{SUdb} = N/A

M_{FLdb} = N/A

M_{FREHdb} = N/A

M_{TFBHdb} = N/A + N/A + N/A - N/A

= **N/A** lbs

= **N/A** kg

BR_H – Dry burn rate for high fire test run, from time when test fuel load is added to end of test run, lb/h (kg/h)

ASTM E3053 equation (6)

$$BR_H = 60 (M_{FLdb} - M_{FLEHdb})/\theta_{H1}$$

Where,

θ_{H1} = Total duration of high fire test run, from time when test fuel load is added to end of test run, min.

Sample calculation:

M_{FLdb} = N/A - Applicable to High Fire Tests Only

M_{FLEHdb} = N/A - Applicable to High Fire Tests Only

θ_{H1} = N/A - Applicable to High Fire Tests Only

$$BR_H = \frac{60 (\text{N/A} - \text{N/A})}{\text{N/A}}$$

BR_H = **N/A** lb/hr

= **N/A** kg/hr

M_{TFBdb} - Total weight of fuel burned during low or medium fire test run, lb (kg), dry basis
ASTM E3053 equation (7)

$$M_{TFBdb} = M_{FLdb} - M_{FREdb}$$

Where,

M_{FLdb} = Total weight of fuel burned during low or medium fire test run, lb (kg), dry basis

M_{FREdb} = Weight of remaining fuel at end of low or medium fire test run, lb (kg)

Sample Calculation:

M_{FLdb} = 20.21

M_{FREdb} = 0.00

M_{TFBdb} = 20.21 - 0.00

= **20.21** lbs

= **9.17** kg

BR - Dry burn rate for low and medium fire test runs, lb/h (kg/h)
ASTM E3053 equation (8)

$$BR = \frac{60\ M_{TFBdb}}{\theta}$$

Where,

θ = Total test run duration for low or medium fire test run, min.

Sample Calculation:

M_{TFBdb} = 20.21

θ = 606

$$BR = \frac{60 \times 20.21}{606}$$

BR = **2.00** lb/hr

= **0.91** kg/hr

V_s – Average gas velocity in the dilution tunnel, ft/sec
ASTM E2515 equation (9)

$$v_s = F_P \times k_p \times C_p \times (\sqrt{\Delta P})_{avg} \times \sqrt{\frac{T_{s(avg)}}{P_s \times M_s}}$$

Where:

F_p = Adjustment factor for pitot tube center point reading = $\frac{V_{strav}}{V_{scent}}$, ASTM E2515 Equation (1)

v_{scent} = Dilution tunnel velocity calculated after the multi-point pitot traverse at the center, ft/sec

v_{strav} = Dilution tunnel velocity calculated after the multi-point pitot traverse, ft/sec

k_p = Pitot tube constant, 85.49

C_p = Pitot tube coefficient: 0.99, unitless

ΔP* = Velocity pressure in the dilution tunnel, in H_2O

T_s = Absolute average gas temperature in the dilution tunnel, °R; (°R = °F + 460)

P_s = Absolute average gas static pressure in dilution tunnel, = $P_{bar} + P_g$, in Hg

P_{bar} = Barometric pressure at test site, in. Hg

P_g = Static pressure of tunnel, in. H_20; (in Hg = in H_20/13.6)

M_s = **The dilution tunnel wet molecular weight; M_s = 28.78 assuming a dry weight of 29 lb/lb-mole

Sample calculation:

$$Fp = \frac{16.10}{17.94} = 0.897$$

$$V_s = 0.897 \times 85.49 \times 0.99 \times 0.272 \times \left(\frac{82.3 + 460}{\left(29.91 + \frac{-0.31}{13.6}\right) \times 28.78} \right)^{1/2}$$

V_s = **16.40** ft/s

*The ASTM test standard mistakenly has the square root of the average delta p instead of the average of the square root of delta p. The current EPA Method 2 is also incorrect. This was verified by Mike Toney at EPA.

**The ASTM test standard mistakenly identifies Ms as the dry molecular weight. It should be the wet molecular weight as indicated in EPA Method 2.

Q_{sd} – Average gas flow rate in dilution tunnel, dscf/hr

ASTM E2515 equation (3)

$$Q_{sd} = 3600 \times (1 - B_{ws}) \times v_s \times A \times \frac{T_{std}}{T_{s(avg)}} \times \frac{P_s}{P_{std}}$$

Where:

3600	=	Conversion from seconds to hours (ASTM method uses 60 to convert in minutes)
B_{ws}	=	Water vapor in gas stream, proportion by volume; assume 2%
A	=	Cross sectional area of dilution tunnel, ft^2
T_{std}	=	Standard absolute temperature, 528 °R
P_s	=	Absolute average gas static pressure in dilution tunnel, = P_{bar} + P_g , in Hg
$T_{s(avg)}$	=	Absolute average gas temperature in the dilution tunnel, °R; (°R = °F + 460)
P_{std}	=	Standard absolute pressure, 29.92 in Hg

Sample calculation:

$$Q_{sd} = 3600 \times (1 - 0.02) \times 16.40 \times 0.1963 \times \frac{528}{82.3 + 460} \times \frac{29.91 + \frac{-0.31}{13.6}}{29.92}$$

Q_{sd} = **11050.6** dscf/hr

$V_{m(std)}$ – Volume of Gas Sampled Corrected to Dry Standard Conditions, dscf
ASTM E2515 equation (6)

$$V_{m(std)} = K_1 V_m Y \frac{P_{bar} + \frac{\Delta H}{13.6}}{T_m}$$

Where:

K_1	=	17.64 °R/in. Hg
V_m	=	Volume of gas sample measured at the dry gas meter, dcf
Y	=	Dry gas meter calibration factor, dimensionless
P_{bar}	=	Barometric pressure at the testing site, in. Hg
ΔH	=	Average pressure differential across the orifice meter, in. H_2O
T_m	=	Absolute average dry gas meter temperature, °R

Sample Calculation:

Using equation for Train 1:

$$V_{m(std)} = 17.64 \times 109.620 \times 0.986 \times \frac{\left(29.91 + \frac{0.39}{13.6}\right)}{(77.3 + 460)}$$

$V_{m(std)}$ = **106.217** dscf

Using equation for Train 2:

$$V_{m(std)} = 17.64 \times 107.523 \times 1.004 \times \frac{\left(29.91 + \frac{0.41}{13.6}\right)}{(73.4 + 460)}$$

$V_{m(std)}$ = **106.871** dscf

Using equation for ambient train:

$$V_{m(std)} = 17.64 \times 0.00 \times 1 \times \frac{\left(29.91 + \frac{0.00}{13.6}\right)}{(69.2 + 460)}$$

$V_{m(std)}$ = **0** dscf

m_n – Total Particulate Matter Collected, mg
ASTM E2515 Equation (12)

$$m_n = m_p + m_f + m_g$$

Where:

m_p = mass of particulate matter from probe, mg

m_f = mass of particulate matter from filters, mg

m_g = mass of particulate matter from filter seals, mg

Sample Calculation:

Using equation for Train A (first hour):

m_n = 0.0 + 3.6 + 0.0

m_n = 3.6 mg

Using equation for Train A (post-first hour):

m_n = 0.5 + 1.5 + 1.0

m_n = 3.0 mg

Train A aggregate:

m_n = 3.6 + 3.0

m_n = **6.6** mg

Using equation for Train B:

m_n = 0.4 + 4.6 + 1.2

m_n = **6.2** mg

C_s - Concentration of particulate matter in tunnel gas, dry basis, corrected to STP, g/dscf
ASTM E2515 equation (13)

$$C_s = K_2 \times \frac{m_n}{V_{m(std)}}$$

Where:

K_2	=	Constant, 0.001 g/mg
m_n	=	Total mass of particulate matter collected in the sampling train, mg
$V_{m(std)}$	=	Volume of gas sampled corrected to dry standard conditions, dscf

Sample calculation:

For Train 1:

$$C_s = 0.001 \times \frac{6.6}{106.22}$$

$C_s =$ **0.00006** g/dscf

For Train 2

$$C_s = 0.001 \times \frac{6.2}{106.87}$$

$C_s =$ **0.00006** g/dscf

For Ambient Train

$$C_r = 0.001 \times \frac{0.0}{0}$$

$C_r =$ **0** g/dscf

E_T – Total Particulate Emissions, g
ASTM E2515 equation (15)

$$E_T = (c_s - c_r) \times Q_{std} \times \theta$$

Where:

C_s	=	Concentration of particulate matter in tunnel gas, g/dscf
C_r	=	Concentration particulate matter room air, g/dscf
Q_{std}	=	Average dilution tunnel gas flow rate, dscf/hr
θ	=	Total time of test run, minutes

Sample calculation:

For Train 1

E_T = (0.000062 - 0) x 11050.6 x 606 /60

E_T = **6.94** g

For Train 2

E_T = (0.000058 - 0) x 11050.6 x 606 /60

E_T = **6.48** g

Average

E = **6.71** g

Total emission values shall not differ by more than 7.5% from the total average emissions

7.5% of the average =	0.50
Train 1 difference =	0.23
Train 2 difference =	0.23

PR - Proportional Rate Variation

ASTM E2515 equation (16)

$$PR = \left[\frac{\theta \times V_{mi} \times V_s \times T_m \times T_{si}}{\theta_i \times V_m \times V_{si} \times T_{mi} \times T_s} \right] \times 100$$

Where:

θ	=	Total sampling time, min
θ_i	=	Length of recording interval, min
V_{mi}	=	Volume of gas sample measured by the dry gas meter during the “ith” time interval, dcf
V_m	=	Volume of gas sample as measured by dry gas meter, dcf
V_{si}	=	Average gas velocity in the dilution tunnel during the "ith" time interval, ft/sec
V_s	=	Average gas velocity in the dilution tunnel, ft/sec
T_{mi}	=	Absolute average dry gas meter temperature during the "ith" time interval, ^oR
T_m	=	Absolute average dry gas meter temperature, ^oR
T_{si}	=	Absolute average gas temperature in the dilution tunnel during the "ith" time interval, ^oR
T_s	=	Absolute average gas temperature in the dilution tunnel, ^oR

Sample calculation (for the first 1 minute interval of Train 1):

$$PR = \left(\frac{606 \times 0.181 \times 16.40 \times (117.0 + 460) \times (77.3 + 460)}{1 \times 109.62 \times 16.92 \times (82.3 + 460) \times (71.0 + 460)} \right) \times 100$$

PR = **104** %

PM_{RH} - Particulate emission rate for high fire test run, g/hr;
ASTM E3053 equation (9)

$$PM_{RH} = 60(E_{TH}/\theta_{H2})$$

Where,

E_{TH} = Total particulate emissions for high fire test run including kindling and start-up, g

θ_{H2} = Total duration of high fire test run, from ignition of kindling to end of test run, min.

Sample Calculation:

E_{TH} = N/A - Applicable to High Fire Tests Only

θ_{H2} = N/A - Applicable to High Fire Tests Only

PM_{RH} = 60(N/A / N/A)

PM_{RH} = **N/A** g/hr

PM_{FH} - Particulate emission factor for high fire test run, g/dry kg of fuel burned.

ASTM E3053 equation (10)

$$PM_{FH} = E_{TH}/M_{TFBHdb}$$

Sample Calculation:

E_{TH} = N/A - Applicable to High Fire Tests Only

M_{TFBHdb} = N/A - Applicable to High Fire Tests Only

PM_{FH} = N/A / N/A

= **N/A** g/kg

PM_R - Particulate emission rate for low or medium fire test runs, g/hr
ASTM E3053 equation (12)

$$PM_R = 60(E_T/\theta)$$

Where,

E_T = Total particulate emissions for low or medium fire test runs from Test Method E2515, g

Sample Calculation:

E_T = 6.71
θ = 606

PM_R = 60(6.71 / 606)

PM_{RH} = **0.66** g/hr

PM_{FH} - Particulate emission factor for high fire test run, g/dry kg of fuel burned.
ASTM E3053 equation (13)

$$PM_F = E_T/M_{TFBdb}$$

Sample Calculation:

E_T = 6.71
M_{TFBdb} = 9.17

PM_{FH} = 6.71 / 9.17
= **0.73** g/kg

ASTM E3053 Wood Heater Run Sheets

Client: IHP | Job Number: 19-468 | Tracking #: 0026
Model: ST210GL | Run Number: 1 | Test Date: 4/10/2019

Wood Heater Run Notes

Pre-Test Notes
Pre-Test Start Time: N/A
Air Control Setting: N/A

Time	Notes
N/A	N/A

Test Notes
Test Burn Start Time: 10:03
Air Control Setting: Fully Open

Time	Notes
0 min	Put all kindling and start-up fuel in firebox, lit with propane torch for 1 minute, then closed door.
43 min	Changed front filter on both sample trains
46 min	Leveled coal bed, loaded high fire test fuel
60 min	Changed front filter on both sample trains
76 min	It was discovered that one of the sample meters had stopped working and was not properly logging values, invalidating any test values. Sampling equipment was turned off, but the fire was left untouched to use for a low burn test upon completion of the high fire test.

Test Burn End Time: N/A

Flue Gas Concentration Measurement

Calibration Gas Values: Span Gas CO_2 (%): 9.00 CO (%): 0.500
Mid Gas CO_2 (%): - CO (%): -

Calibration Results:

	Pre Test			Post Test		
	Zero	Mid	Span	Zero	Mid	Span
Time	8:30	-	8:36	N/A	N/A	N/A
CO_2	0.00	-	9.00	N/A	N/A	N/A
CO	0.00	-	0.500	N/A	N/A	N/A

Flue Gas Probe Leak Check: Initial: No Leakage Final: No Leakage

Technician Signature:  Date: 4/11/2019

ASTM E3053 Wood Heater Run Sheets

Client: IHP | Job Number: 19-468 | Tracking #: 0026
Model: ST210GL | Run Number: 1 | Test Date: 4/10/2019

Test Photos



Kindling Fuel Load



Start-up Fuel Load



High Fire Fuel Load



Residual Start-up Fuel Coal Bed

Technician Signature: _____ Date: 4/11/2019

ASTM E3053 Wood Heater Run Sheets

Client: IHP Job Number: 19-468 Tracking #: 0026
Model: ST210GL Run Number: 1 Test Date: 4/10/2019



High Fire Fuel Loaded



Residual High Fire Load Coal Bed

N/A

Low Fire Fuel Load

N/A

Low Fire Fuel Loaded

Technician Signature: _____ Date: 4/11/2019

WOOD STOVE TEST DATA PACKET
ASTM E3053/E2515



Run 2 Data Summary

Client: IHP
Model: ST210GL
Job #: 19-468
Tracking #: 0026
Test Date: 4/10/2019



4/18/2019

Techician Signature | Date

TEST RESULTS - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 2

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/10/2019

Burn Rate (kg/hr):	0.91

	Ambient Sample	Sample Train A	Sample Train B	1st Hour Filter
Total Sample Volume (ft^3)	0.000	109.620	107.523	10.853
Average Gas Velocity in Dilution Tunnel (ft/sec)	16.40			
Average Gas Flow Rate in Dilution Tunnel (dscf/hr)	11050.6			
Average Gas Meter Temperature (°F)	69.2	77.3	73.4	73.5
Total Sample Volume (dscf)	0.000	106.217	106.871	10.591
Average Tunnel Temperature (°F)	82.3			
Total Time of Test (min)	606			
Total Particulate Catch (mg)	0.0	6.6	6.2	3.6
Particulate Concentration, dry-standard (g/dscf)	0.0000000	0.0000621	0.0000580	0.0003399
Total PM Emissions (g)	0.00	6.94	6.48	3.76
Particulate Emission Rate (g/hr)	0.00	0.69	0.64	3.76
Emissions Factor (g/kg)	-	0.75	0.70	-
Difference from Average Total Particulate Emissions (g)	-	0.23	0.23	-
Difference from Average Emissions Factor (g/kg)	-	0.03	0.03	-

Final Average Results	
Total Particulate Emissions (g)	6.71
Particulate Emission Rate (g/hr)	0.66
Emissions Factor (g/kg)	0.73
HHV Efficiency (%)	71.7%
LHV Efficiency (%)	76.6%
CO Emissions (g/min)	1.41

Quality Checks	Requirement	Observed	Result
Dual Train Precision	Each train within 7.5% of average emissions (in grams), or emission factors within 0.5 g/kg	See Above	OK
Filter Temps	>80 °F, <90 °F	Min: 80 / Max: 90	OK
Face Velocity	< 30 ft/min	9.7	OK
Leakage Rate	Less than 4% of average sample rate	0.002 cfm	OK
Ambient Temp	55-90 °F	Min: 64 / Max: 77	OK
Negative Probe Weight Evaluation	<5% of Total Catch	Probe Catch Not Negative	OK
Pro-Rate Variation	90% of readings between 90-110%; none greater than 120% or less than 80%	See Data Tabs	OK

B415.1 Efficiency Results

Manufacturer:	IHP
Model:	ST210GL
Date:	04/10/19
Run:	2
Control #:	19-468
Test Duration:	606
Output Category:	Low

Test Results in Accordance with CSA B415.1-09

	HHV Basis	LHV Basis
Overall Efficiency	71.7%	76.6%
Combustion Efficiency	94.7%	94.7%
Heat Transfer Efficiency	75.7%	81.0%

Output Rate (kJ/h)	12,917	12,253	**(Btu/h)**
Burn Rate (kg/h)	0.90	1.99	**(lb/h)**
Input (kJ/h)	18,025	17,099	**(Btu/h)**

Test Load Weight (dry kg)	9.12	20.10	**dry lb**
MC wet (%)	16.93		
MC dry (%)	20.38		
Particulate (g)	6.71		
CO (g)	853		
Test Duration (h)	10.10		

Emissions	Particulate	CO
g/MJ Output	0.05	6.54
g/kg Dry Fuel	0.74	93.50
g/h	0.66	84.44
g/min	0.01	1.41
lb/MM Btu Output	0.12	15.19

Air/Fuel Ratio (A/F)	22.52

VERSION: **2.2** **12/14/2009**

HIGH FIRE FUEL LOAD DATA - ASTM E3053

Client: IHP
Job #: 19-468
Model: ST210GL
Tracking #: 0026
Run #: 2
Technician: SJB
Date: 4/10/2019

Nominal Loading Density (lbs/ft^3, wet basis):	10		
Usable Firebox Volume (ft^3):	2.12		
Target Load Weight (lbs):	21.20		
Total Load Weight Range (lbs):	20.10	to	22.30
Core Load Weight Range (lbs):	9.50	to	13.80
Remainder Load Weight Range (lbs):	7.40	to	11.70
Core Load Piece Range (lbs):	3.20	to	5.30
Remainder Load Piece Range (lbs):	2.10	to	11.70
Max Allowable Kindling Weight (lbs):	4.26		
Max Allowable Start-up Fuel Weight (lbs):	6.39		

CORE LOAD DATA

				Fuel Piece Moisture Readings (%DB)					Dry Weight	
Piece #	Length (in)	Weight (lbs)	Within Spec?	1	2	3	Ave.	Within Spec?	lbs	kg
1	15.00	3.31	In Range	17.9	19.3	18.4	18.5	In Range	2.79	1.27
2	15.00	4.32	In Range	22.4	17.1	19.4	19.6	In Range	3.61	1.64
3	15.00	4.01	In Range	19.1	17.7	18.5	18.4	In Range	3.39	1.54
Core Load Wt. (lbs)		11.64	In Range							

REMAINDER LOAD DATA (1 to 3 Pieces)

				Fuel Piece Moisture Readings (%DB)					Dry Weight	
Piece #	Length (in)	Weight (lbs)	Within Spec?	1	2	3	Ave.	Within Spec?	lbs	kg
1	15.00	4.76	In Range	25.7	17.5	19.8	21.0	In Range	3.93	1.78
2	15.00	2.81	In Range	23.9	24.1	17.8	21.9	In Range	2.30	1.05
3	15.00	2.10	In Range	20.1	19.3	17.8	19.1	In Range	1.76	0.80
Remainder Load (lbs)		9.67	In Range							

Total Load Weight (lbs):	21.31	In Range	
Core Load % of Total Weight:	55%	In Range	45-65%
Remainder % of Total Weight:	45%	In Range	35-55%
Total Load % of Target Weight:	101%	In Range	95-105%
Actual Fuel Loading Density (lb/ft3):	10.1		
Total Load Average Moisture Conent (%DB):	19.8	In Range	19-25%
Total Load Average Moisture Conent (%WB):	16.5		
Total Test Load Weight (dry basis):	17.79 lbs	8.07 kg	

KINDLING AND START-UP FUEL

		Kindling Moisture Readings (%DB)					Dry Weight	
Kindling Weight (lbs)	Within Spec?	1	2	3	Avg.	Within Spec?	lbs	kg
3.30	In Range	10	10	10	10.0	In Range	3.00	1.36

		Start-up Moisture Readings (%DB)					Dry Weight	
Start-up Fuel Wt. (lb)	Within Spec?	1	2	3	Avg.	Within Spec?	lbs	kg
5.10	In Range	22.5	19.8	20.4	20.9	In Range	4.22	1.91

TEST FUEL LOADING RANGE

Allowable Residual Start-up Fuel Range (lb):	2.1	to	4.3	
Actual Residual Start-up Fuel Weight (lb):	2.1			In Range

LOW & MEDIUM FIRE FUEL LOAD DATA - ASTM E3053

Client: IHP
Job #: 19-468
Model: ST210GL
Tracking #: 0026
Run #: 2
Technician: SJB
Date: 4/10/2019

Nominal Loading Density (lbs/ft^3, wet basis):	12		
Usable Firebox Volume (ft^3):	2.12		
Target Load Weight (lbs):	25.44		
Total Load Weight Range (lbs):	24.17	to	26.71
Core Load Weight Range (lbs):	11.45	to	16.54
Remainder Load Weight Range (lbs):	8.90	to	13.99
Core Load Piece Range (lbs):	3.82	to	6.36
Remainder Load Piece Range (lbs):	2.54	to	7.63

CORE LOAD DATA

				Fuel Piece Moisture Readings (%DB)					Dry Weight	
Piece #	Length (in)	Weight (lbs)	Within Spec?	1	2	3	Ave.	Within Spec?	lbs	kg
1	15.00	4.31	In Range	17.4	23.7	23.0	21.4	In Range	3.55	1.61
2	15.00	4.37	In Range	19.4	19.6	20.1	19.7	In Range	3.65	1.66
3	15.00	3.84	In Range	23.7	18.5	20.8	21.0	In Range	3.17	1.44
Core Load Wt. (lbs)		12.52	In Range							

REMAINDER LOAD DATA (2 to 3 Pieces)

				Fuel Piece Moisture Readings (%DB)					Dry Weight	
Piece #	Length (in)	Weight (lbs)	Within Spec?	1	2	3	Ave.	Within Spec?	lbs	kg
1	15.00	4.64	In Range	20.5	19.7	18.6	19.6	In Range	3.88	1.76
2	15.00	2.90	In Range	19.3	17.6	19.3	18.7	In Range	2.45	1.11
3	15.00	4.26	In Range	21.0	22.4	21.3	21.6	In Range	3.50	1.59
Remainder Load (lbs)		11.81	In Range							

Remainder Load Small/Large Piece Weight Ratio:	63%	In Range	≤ 67%
Total Load Weight (lbs):	24.33	In Range	
Core Load % of Total Weight:	51%	In Range	45-65%
Remainder % of Total Weight:	49%	In Range	35-55%
Total Load % of Target Weight:	96%	In Range	95-105%
Actual Fuel Loading Density (lb/ft3):	11.5		
Total Load Average Moisture Conent (%DB):	20.4	In Range	19-25%
Total Load Average Moisture Conent (%WB):	16.9		
Total Test Load Weight (dry basis):	20.21 lbs	9.17 kg	

TEST FUEL LOADING RANGE

Allowable Charcoal Bed Weight Range (lb):	2.5	to	4.8	
Actual Charcoal Bed Wt. (lb):		2.8		In Range

TEST END POINT

Actual Fuel Load Ending Weight (lb):	0.0	Valid Test (≥90%)

Total Fuel Burned During Test Run:	24.3	lbs, wet basis
	20.2	lbs, dry basis
	9.17	kg, dry basis

DILUTION TUNNEL & MISC. DATA - ASTM E3053 / E2515

Client:	IHP	Job #:	19-468
Model:	ST210GL	Tracking #:	0026
Run #:	2	Technician:	SJB
Test Start Time:	13:10	Date:	4/10/2019
Test Type:	Low Fire		

Recording Interval (min):	1
Total Sampling Time (min):	606

	Pre-Test	Post Test	Avg.
Barometric Pressure (in. Hg)	29.96	29.85	29.91
Relative Humidity (%)	35.9	29.7	
Room Air Velocity (ft/min)	0	0	
Scale Audit (lbs)	10.0	10.0	

Meter Box γ Factor:	0.986	(A)	
Meter Box γ Factor:	1.004	(B)	
Meter Box γ Factor:	1.000	(Ambient)	
Ambient Sample Volume:	0.000	ft^3	

Induced Draft Check (in. H_2O):	0
Smoke Capture Check (%):	100%
Date Flue Pipe Last Cleaned:	4/10/2019

Sample Train Post-Test Leak Checks

(A)	0.000	cfm @	-10	in. Hg
(B)	0.002	cfm @	-14	in. Hg
(Ambient)	0.000	cfm @	0	in. Hg

DILUTION TUNNEL FLOW

Traverse Data

Point	dP (in H_2O)	Temp (°F)
1	0.046	63
2	0.070	63
3	0.064	63
4	0.050	63
5	0.054	63
6	0.068	63
7	0.066	63
8	0.048	63
Center	0.074	63

Static Pressure: -0.310 in. H_2O

Dilution Tunnel H_2O:	2.00	percent
Tunnel Diameter:	6	inches
Pitot Tube Cp:	0.99	[unitless]
Dilution Tunnel MW(dry):	29.00	lb/lb-mole
Dilution Tunnel MW(wet):	28.78	lb/lb-mole
Tunnel Area:	0.1963	ft^2
V_{strav}:	16.10	ft/sec
V_{scent}:	17.94	ft/sec
F_p:	0.897	[ratio]
Initial Tunnel Flow:	184.9	scf/min

TEST FUEL PROPERTIES

ASTM 3053-17 - Table A1.1 Fuel Properties by Fuel Species

Select Fuel Type	Species	%C	%H	%O	%Ash	MJ/kg	BTU/lb
	Ash, White	49.70	6.90	43.00	0.30	20.75	8927
	Beech	48.70	5.80	44.70	0.60	18.80	8088
	Birch, Sweet	49.80	6.50	43.40	0.30	20.12	8656
	Birch, Yellow	49.80	6.50	43.40	0.30	20.12	8656
	Doug Fir (Coast, Interior West/North)	48.73	6.87	43.90	0.50	19.81	8522
	Doug Fir (Interioir South)	48.73	6.87	43.90	0.50	19.81	8522
	Elm, Rock	50.40	6.60	42.30	0.70	20.49	8815
	Elm, Soft	50.40	6.60	42.30	0.70	20.49	8815
	Gum, Red	50.88	6.06	41.57	1.28	19.72	8478
	Larch, Western	50.54	6.36	42.40	0.70	17.58	7558
X	Maple, Hard	50.64	6.02	41.74	1.35	19.96	8587
	Maple, Sugar	50.64	6.02	41.74	1.35	19.96	8587
	Oak, Red	49.50	6.62	43.70	0.20	20.20	8690
	Oak, White	50.40	6.59	42.70	0.20	20.50	8819
	Pine, Southern	52.60	7.00	40.10	1.31	22.30	9587
	Pine, Southern Long Leaf	52.60	7.02	40.10	1.30	22.30	9594
	Other						

WOODSTOVE PREBURN DATA

Client:	IHP	Job #:	19-468
Model:	ST210GL	Tracking #:	0026
Run #:	2	Technician:	SJB
		Date:	4/10/2019

Test Run performed as a continuation of High Fire Test Run 1

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 2

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/10/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
0	0.000		0.074	0.00	71	-0.73		24.3		110	329	85	73
1	0.181	0.181	0.074	0.39	71	-0.21	104	24.2	-0.1	117	276	84	73
2	0.362	0.181	0.074	0.38	71	0.27	103	24.2	0	104	285	82	72
3	0.543	0.181	0.074	0.38	71	-0.44	103	24.2	0	102	297	88	72
4	0.724	0.181	0.074	0.38	71	0.5	103	24.0	-0.2	101	317	88	73
5	0.904	0.180	0.074	0.37	71	0.52	103	23.9	-0.1	104	360	85	72
6	1.085	0.181	0.074	0.39	71	-0.59	103	23.7	-0.2	106	397	82	72
7	1.266	0.181	0.074	0.40	71	-0.26	104	23.5	-0.2	110	433	82	72
8	1.447	0.181	0.074	0.39	71	0.74	104	23.3	-0.2	113	459	83	73
9	1.628	0.181	0.074	0.39	71	0.53	104	23.1	-0.2	117	487	85	72
10	1.809	0.181	0.074	0.38	71	0.8	105	22.9	-0.2	120	510	86	73
11	1.990	0.181	0.074	0.37	71	0.08	105	22.6	-0.3	123	533	86	73
12	2.171	0.181	0.074	0.39	72	0.06	105	22.5	-0.1	127	550	86	75
13	2.352	0.181	0.074	0.35	72	0.8	106	22.2	-0.3	131	563	85	73
14	2.532	0.180	0.074	0.27	72	4.04	105	21.8	-0.4	133	571	82	75
15	2.713	0.181	0.074	0.48	72	0.63	106	21.5	-0.3	136	582	87	73
16	2.894	0.181	0.074	0.39	72	-0.05	105	21.4	-0.1	125	499	85	74
17	3.075	0.181	0.074	0.38	72	-0.47	104	21.2	-0.2	119	464	84	74
18	3.256	0.181	0.074	0.39	72	0.77	104	21.0	-0.2	114	434	84	74
19	3.437	0.181	0.074	0.39	72	-0.04	104	20.9	-0.1	111	417	88	74
20	3.618	0.181	0.074	0.39	72	0.55	104	20.9	0	109	408	90	75
21	3.799	0.181	0.074	0.39	72	0.54	103	20.6	-0.3	108	404	90	75
22	3.980	0.181	0.074	0.38	73	0.73	103	20.5	-0.1	107	405	87	73
23	4.160	0.180	0.074	0.39	73	-0.28	103	19.9	-0.6	107	407	85	74
24	4.341	0.181	0.074	0.39	73	0.67	103	19.6	-0.3	107	410	84	74
25	4.522	0.181	0.074	0.39	73	0	103	20.1	0.5	106	413	84	75
26	4.703	0.181	0.074	0.39	73	-0.33	103	20.0	-0.1	106	412	88	74
27	4.884	0.181	0.074	0.39	73	-0.21	103	19.7	-0.3	106	414	90	74
28	5.065	0.181	0.074	0.38	73	0.98	103	19.7	0	107	415	87	75
29	5.246	0.181	0.074	0.39	73	0.71	103	19.4	-0.3	106	418	85	75
30	5.427	0.181	0.074	0.38	73	0.36	103	19.3	-0.1	106	416	83	74
31	5.608	0.181	0.074	0.39	74	0.7	103	19.1	-0.2	106	414	82	75
32	5.789	0.181	0.074	0.39	74	-0.22	103	19.6	0.5	106	413	83	76

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 2

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/10/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
33	5.969	0.180	0.074	0.39	74	-0.55	102	18.6	-1	106	412	86	74
34	6.150	0.181	0.074	0.38	74	-0.16	103	18.7	0.1	105	408	88	75
35	6.331	0.181	0.074	0.38	74	0.72	103	18.4	-0.3	105	406	84	75
36	6.512	0.181	0.074	0.39	74	0.37	103	18.4	0	105	404	85	75
37	6.693	0.181	0.074	0.39	74	-0.23	103	17.8	-0.6	104	402	84	74
38	6.874	0.181	0.074	0.39	74	-0.06	103	18.5	0.7	104	400	83	75
39	7.055	0.181	0.074	0.39	75	0.02	102	17.9	-0.6	104	401	84	75
40	7.236	0.181	0.074	0.40	75	0.66	102	17.7	-0.2	104	403	84	74
41	7.417	0.181	0.074	0.39	75	-0.46	102	17.6	-0.1	104	406	85	74
42	7.597	0.180	0.074	0.39	75	-0.17	102	17.4	-0.2	105	406	86	75
43	7.778	0.181	0.074	0.39	75	-0.18	103	17.3	-0.1	105	409	86	75
44	7.959	0.181	0.074	0.39	75	0.09	103	17.2	-0.1	105	408	87	74
45	8.140	0.181	0.074	0.39	75	0.7	103	17.0	-0.2	105	408	87	75
46	8.321	0.181	0.074	0.39	75	-0.44	102	16.6	-0.4	104	406	86	74
47	8.502	0.181	0.074	0.39	75	-0.49	102	16.7	0.1	104	403	86	76
48	8.683	0.181	0.074	0.39	76	-0.4	102	16.0	-0.7	104	401	86	74
49	8.864	0.181	0.074	0.39	76	-0.13	102	16.5	0.5	104	397	87	76
50	9.045	0.181	0.074	0.38	76	0.79	102	15.6	-0.9	104	395	87	75
51	9.225	0.180	0.074	0.38	76	0.79	102	16.1	0.5	104	393	88	75
52	9.406	0.181	0.074	0.38	76	0.5	102	15.4	-0.7	103	390	87	74
53	9.587	0.181	0.074	0.37	76	0.33	102	16.2	0.8	103	388	86	74
54	9.768	0.181	0.074	0.39	76	0.5	102	15.8	-0.4	103	388	85	73
55	9.949	0.181	0.074	0.39	76	0.69	102	15.7	-0.1	103	385	85	75
56	10.130	0.181	0.074	0.39	76	0.9	102	15.6	-0.1	102	385	84	75
57	10.311	0.181	0.074	0.39	76	1.08	102	15.4	-0.2	102	386	83	74
58	10.492	0.181	0.074	0.39	76	0.86	102	15.2	-0.2	102	384	84	74
59	10.673	0.181	0.074	0.39	76	0.22	102	15.3	0.1	102	385	85	74
60	10.853	0.180	0.074	0.39	77	0.98	101	15.7	0.4	102	387	86	73
61	11.034	0.181	0.074	0.43	77	0.69	102	14.8	-0.9	102	388	85	73
62	11.215	0.181	0.074	0.41	77	-0.42	102	14.7	-0.1	102	390	87	75
63	11.396	0.181	0.074	0.40	77	0.72	102	14.6	-0.1	102	391	86	75
64	11.577	0.181	0.074	0.39	77	0.19	102	14.6	0	102	395	87	76
65	11.758	0.181	0.074	0.39	77	-0.04	102	14.3	-0.3	102	397	88	75

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 2

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/10/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
66	11.939	0.181	0.074	0.39	77	-0.23	102	14.2	-0.1	103	402	88	75
67	12.120	0.181	0.074	0.38	77	-0.14	102	14.0	-0.2	104	408	88	75
68	12.301	0.181	0.074	0.38	77	-0.18	102	13.9	-0.1	104	409	87	74
69	12.481	0.180	0.074	0.38	77	0.1	102	13.8	-0.1	104	408	86	75
70	12.662	0.181	0.074	0.38	77	0.7	102	13.7	-0.1	104	406	86	76
71	12.843	0.181	0.074	0.38	77	0.69	102	13.5	-0.2	104	408	85	76
72	13.024	0.181	0.074	0.38	77	0.09	102	13.3	-0.2	104	405	84	76
73	13.205	0.181	0.074	0.38	77	0.7	102	13.3	0	104	405	83	76
74	13.386	0.181	0.074	0.38	77	0.14	102	13.0	-0.3	104	404	83	75
75	13.567	0.181	0.074	0.38	77	-0.25	102	12.9	-0.1	104	402	83	76
76	13.748	0.181	0.074	0.38	78	-0.35	102	12.8	-0.1	103	403	84	77
77	13.929	0.181	0.074	0.38	78	-0.36	102	12.7	-0.1	103	402	84	76
78	14.110	0.181	0.074	0.38	78	-0.44	102	12.6	-0.1	103	401	84	76
79	14.290	0.180	0.074	0.38	78	0.79	101	12.4	-0.2	103	401	84	76
80	14.471	0.181	0.074	0.38	78	0.98	102	12.3	-0.1	103	399	85	76
81	14.652	0.181	0.074	0.38	78	-0.21	102	10.8	-1.5	103	398	85	76
82	14.833	0.181	0.074	0.37	78	-0.3	102	12.2	1.4	103	393	85	76
83	15.014	0.181	0.074	0.38	78	-0.07	102	11.9	-0.3	102	389	85	76
84	15.195	0.181	0.074	0.38	78	-0.12	102	11.7	-0.2	101	386	85	76
85	15.376	0.181	0.074	0.37	78	-0.16	102	11.7	0	101	382	84	76
86	15.557	0.181	0.074	0.37	78	0.1	102	10.9	-0.8	101	381	84	76
87	15.738	0.181	0.074	0.38	78	0.56	102	11.4	0.5	101	379	84	76
88	15.918	0.180	0.074	0.38	78	0.87	101	11.4	0	101	378	84	76
89	16.099	0.181	0.074	0.37	78	0.12	102	11.2	-0.2	100	377	84	76
90	16.280	0.181	0.074	0.37	78	0.6	102	11.2	0	100	375	84	76
91	16.461	0.181	0.074	0.38	78	0.88	102	10.9	-0.3	100	372	84	75
92	16.642	0.181	0.074	0.38	78	0.64	102	10.9	0	100	370	84	75
93	16.823	0.181	0.074	0.38	78	0.9	101	10.8	-0.1	99	369	84	76
94	17.004	0.181	0.074	0.38	78	0.1	101	10.7	-0.1	99	370	84	75
95	17.185	0.181	0.074	0.38	78	0.5	101	10.7	0	99	369	84	75
96	17.366	0.181	0.074	0.38	78	-0.12	101	10.6	-0.1	99	366	84	75
97	17.546	0.180	0.074	0.37	78	-0.25	101	10.4	-0.2	99	363	84	74
98	17.727	0.181	0.074	0.38	78	-0.39	101	10.3	-0.1	99	364	84	75

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 2

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/10/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
99	17.908	0.181	0.074	0.37	79	-0.21	101	10.2	-0.1	99	364	84	75
100	18.089	0.181	0.074	0.38	79	-0.48	101	10.2	0	99	366	84	75
101	18.270	0.181	0.074	0.37	79	-0.43	101	9.9	-0.3	99	367	85	75
102	18.451	0.181	0.074	0.37	79	0.77	101	9.9	0	99	367	85	75
103	18.632	0.181	0.074	0.37	79	0.08	101	9.7	-0.2	99	367	86	76
104	18.813	0.181	0.074	0.37	79	0.74	101	9.7	0	99	366	86	75
105	18.994	0.181	0.074	0.37	79	-0.2	101	9.6	-0.1	99	364	87	75
106	19.174	0.180	0.074	0.37	79	0.82	101	9.4	-0.2	99	359	87	75
107	19.355	0.181	0.074	0.38	79	0.14	101	9.4	0	98	357	88	76
108	19.536	0.181	0.074	0.40	79	-0.27	101	9.2	-0.2	98	355	87	75
109	19.717	0.181	0.074	0.40	79	0.89	101	9.2	0	97	353	88	75
110	19.898	0.181	0.074	0.40	79	0.97	101	9.2	0	97	350	88	74
111	20.079	0.181	0.074	0.39	79	-0.36	101	9.5	0.3	97	348	88	74
112	20.260	0.181	0.074	0.40	79	0.16	101	8.9	-0.6	97	347	89	74
113	20.441	0.181	0.074	0.40	79	-0.35	101	8.9	0	97	345	89	74
114	20.622	0.181	0.074	0.40	79	0.2	101	8.7	-0.2	96	345	89	74
115	20.802	0.180	0.074	0.40	79	0.2	100	8.6	-0.1	96	343	89	74
116	20.983	0.181	0.074	0.40	79	0.18	101	8.6	0	96	344	89	74
117	21.164	0.181	0.074	0.40	79	-0.37	101	8.5	-0.1	96	343	89	74
118	21.345	0.181	0.074	0.40	79	0.36	101	8.4	-0.1	96	342	89	74
119	21.526	0.181	0.074	0.40	79	-0.13	101	8.3	-0.1	96	338	88	73
120	21.707	0.181	0.074	0.40	79	0.89	101	8.3	0	95	336	88	72
121	21.888	0.181	0.074	0.39	79	-0.01	101	8.3	0	95	332	88	75
122	22.069	0.181	0.074	0.40	79	-0.23	101	8.1	-0.2	95	332	88	73
123	22.250	0.181	0.074	0.40	79	-0.47	101	7.9	-0.2	94	330	87	75
124	22.430	0.180	0.074	0.40	79	0.16	100	7.8	-0.1	95	328	86	74
125	22.611	0.181	0.074	0.39	79	-0.27	101	7.7	-0.1	94	327	85	74
126	22.792	0.181	0.074	0.40	79	0.3	101	7.6	-0.1	94	327	84	74
127	22.973	0.181	0.074	0.40	79	0.75	101	7.5	-0.1	94	326	83	74
128	23.154	0.181	0.074	0.40	79	0.63	101	7.5	0	94	327	83	74
129	23.335	0.181	0.074	0.40	79	0.91	101	7.4	-0.1	94	325	83	75
130	23.516	0.181	0.074	0.40	79	-0.38	101	7.7	0.3	94	326	83	74
131	23.697	0.181	0.074	0.40	79	0.15	101	6.7	-1	94	326	83	75

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 2

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/10/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
132	23.878	0.181	0.074	0.40	79	0.2	101	7.1	0.4	94	327	82	75
133	24.059	0.181	0.074	0.39	79	0.24	101	7.1	0	94	327	82	74
134	24.239	0.180	0.074	0.40	79	-0.29	100	7.5	0.4	93	325	82	74
135	24.420	0.181	0.074	0.40	79	0.31	101	6.9	-0.6	94	327	82	73
136	24.601	0.181	0.074	0.40	79	0.91	101	6.7	-0.2	94	326	82	73
137	24.782	0.181	0.074	0.40	79	0.58	101	6.8	0.1	94	328	82	73
138	24.963	0.181	0.074	0.40	79	-0.08	101	6.6	-0.2	94	326	82	73
139	25.144	0.181	0.074	0.40	79	0.81	101	6.5	-0.1	94	324	82	74
140	25.325	0.181	0.074	0.39	79	0.36	101	6.5	0	93	325	82	74
141	25.506	0.181	0.074	0.40	79	0.02	101	6.4	-0.1	93	322	82	74
142	25.687	0.181	0.074	0.40	79	0.95	101	6.2	-0.2	93	321	83	74
143	25.867	0.180	0.074	0.40	79	-0.35	100	6.7	0.5	93	320	84	74
144	26.048	0.181	0.074	0.39	79	0.08	101	6.1	-0.6	93	319	84	73
145	26.229	0.181	0.074	0.40	79	0.15	101	6.2	0.1	93	316	85	74
146	26.410	0.181	0.074	0.39	79	0.29	101	6.1	-0.1	91	309	85	75
147	26.591	0.181	0.074	0.39	79	0.93	101	6.1	0	91	302	86	73
148	26.772	0.181	0.074	0.39	79	0.56	101	6.1	0	91	298	86	74
149	26.953	0.181	0.074	0.40	79	1.19	101	5.9	-0.2	91	295	87	73
150	27.134	0.181	0.074	0.39	79	0.29	100	5.9	0	90	293	87	73
151	27.315	0.181	0.074	0.39	79	0.93	100	5.7	-0.2	90	290	87	74
152	27.495	0.180	0.074	0.39	79	-0.23	100	5.8	0.1	89	287	87	72
153	27.676	0.181	0.074	0.40	79	0.27	100	5.8	0	89	282	87	73
154	27.857	0.181	0.074	0.40	79	0.34	100	5.8	0	89	280	86	73
155	28.038	0.181	0.074	0.39	79	-0.09	100	5.6	-0.2	89	276	85	72
156	28.219	0.181	0.074	0.39	79	0.55	100	5.6	0	88	274	84	73
157	28.400	0.181	0.074	0.40	79	-0.35	100	5.4	-0.2	88	271	84	73
158	28.581	0.181	0.074	0.40	79	0.84	100	5.6	0.2	87	270	84	73
159	28.762	0.181	0.074	0.39	79	0.66	100	5.7	0.1	87	269	84	73
160	28.943	0.181	0.074	0.39	79	-0.36	100	4.6	-1.1	87	267	85	73
161	29.123	0.180	0.074	0.39	79	-0.17	100	5.4	0.8	87	266	85	73
162	29.304	0.181	0.074	0.39	79	0.97	100	5.4	0	87	264	86	72
163	29.485	0.181	0.074	0.39	79	0.16	100	5.3	-0.1	86	259	86	72
164	29.666	0.181	0.074	0.39	79	-0.1	100	5.3	0	86	255	87	71

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 2

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/10/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
165	29.847	0.181	0.074	0.39	79	-0.28	100	5.4	0.1	85	251	87	72
166	30.028	0.181	0.074	0.39	79	0.1	100	5.4	0	85	249	87	72
167	30.209	0.181	0.074	0.39	79	0.33	100	5.3	-0.1	85	246	87	71
168	30.390	0.181	0.074	0.40	79	0.95	100	5.3	0	85	243	88	73
169	30.571	0.181	0.074	0.39	79	0.97	100	5.2	-0.1	85	242	88	71
170	30.751	0.180	0.074	0.39	79	0.3	99	5.3	0.1	84	240	88	72
171	30.932	0.181	0.074	0.39	79	0.81	100	5.2	-0.1	84	239	87	70
172	31.113	0.181	0.074	0.40	79	0.78	100	5.2	0	84	238	86	70
173	31.294	0.181	0.074	0.39	79	0.13	100	5.2	0	84	236	84	70
174	31.475	0.181	0.074	0.40	79	0.75	100	5.2	0	83	234	83	72
175	31.656	0.181	0.074	0.39	79	-0.21	100	5.2	0	83	234	83	72
176	31.837	0.181	0.074	0.39	79	-0.02	100	5.1	-0.1	83	233	83	71
177	32.018	0.181	0.074	0.40	79	0.94	100	5.1	0	83	230	83	71
178	32.199	0.181	0.074	0.39	79	0.9	100	5.0	-0.1	83	230	84	72
179	32.380	0.181	0.074	0.39	79	0.9	100	5.0	0	83	229	85	71
180	32.560	0.180	0.074	0.39	79	0.26	99	5.0	0	82	228	86	71
181	32.741	0.181	0.074	0.39	79	0.98	100	5.0	0	82	227	86	72
182	32.922	0.181	0.074	0.39	79	-0.31	100	4.8	-0.2	82	226	86	71
183	33.103	0.181	0.074	0.39	79	0.35	100	4.9	0.1	82	224	87	71
184	33.284	0.181	0.074	0.39	79	0.97	100	4.9	0	82	223	87	71
185	33.465	0.181	0.074	0.40	79	0	100	5.0	0.1	82	223	87	72
186	33.646	0.181	0.074	0.40	79	-0.34	100	5.1	0.1	82	222	87	70
187	33.827	0.181	0.074	0.39	79	0.66	100	4.9	-0.2	81	219	86	70
188	34.008	0.181	0.074	0.40	79	0.78	100	4.9	0	81	219	85	71
189	34.188	0.180	0.074	0.39	79	0.19	99	4.7	-0.2	81	219	84	70
190	34.369	0.181	0.074	0.39	79	0.86	100	5.0	0.3	81	219	83	70
191	34.550	0.181	0.074	0.40	79	0.85	100	4.8	-0.2	81	218	82	70
192	34.731	0.181	0.074	0.40	79	-0.06	100	3.8	-1	81	218	81	70
193	34.912	0.181	0.074	0.40	79	-0.16	100	5.3	1.5	81	217	82	70
194	35.093	0.181	0.074	0.39	79	0.29	100	4.8	-0.5	81	217	82	71
195	35.274	0.181	0.074	0.39	79	0.03	100	4.9	0.1	81	216	83	70
196	35.455	0.181	0.074	0.40	79	0.22	100	4.7	-0.2	81	216	84	70
197	35.636	0.181	0.074	0.40	79	-0.34	100	4.7	0	80	215	84	70

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 2

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/10/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
198	35.816	0.180	0.074	0.39	79	0.19	99	4.8	0.1	80	213	85	70
199	35.997	0.181	0.074	0.39	79	-0.31	100	4.8	0	80	214	86	69
200	36.178	0.181	0.074	0.40	79	1.01	100	4.7	-0.1	80	214	86	71
201	36.359	0.181	0.074	0.39	79	0.94	100	4.7	0	80	214	86	70
202	36.540	0.181	0.074	0.39	79	-0.17	100	4.8	0.1	80	214	86	69
203	36.721	0.181	0.074	0.40	79	0.22	100	4.6	-0.2	80	213	86	70
204	36.902	0.181	0.074	0.39	79	-0.29	100	4.7	0.1	80	212	86	69
205	37.083	0.181	0.074	0.39	79	-0.27	100	4.7	0	80	212	85	69
206	37.264	0.181	0.074	0.39	79	0.91	100	4.6	-0.1	80	211	85	70
207	37.444	0.180	0.074	0.40	79	-0.27	99	4.6	0	80	211	85	70
208	37.625	0.181	0.074	0.39	79	0.76	100	4.6	0	80	211	85	70
209	37.806	0.181	0.074	0.39	79	0.07	100	4.5	-0.1	80	210	85	70
210	37.987	0.181	0.074	0.40	79	0.09	100	4.5	0	80	208	85	70
211	38.168	0.181	0.074	0.39	79	0.05	100	4.7	0.2	80	209	85	70
212	38.349	0.181	0.074	0.40	79	1.3	100	4.5	-0.2	80	208	85	70
213	38.530	0.181	0.074	0.39	79	-0.3	100	4.6	0.1	80	208	85	71
214	38.711	0.181	0.074	0.39	79	-0.06	100	4.6	0	80	208	85	70
215	38.892	0.181	0.074	0.40	79	0.99	100	4.3	-0.3	80	208	85	70
216	39.072	0.180	0.074	0.39	79	-0.24	99	4.4	0.1	80	208	85	70
217	39.253	0.181	0.074	0.39	79	0.84	99	4.5	0.1	79	207	85	71
218	39.434	0.181	0.074	0.39	79	0.05	100	4.5	0	80	207	85	70
219	39.615	0.181	0.074	0.40	79	0.74	100	4.5	0	80	207	85	70
220	39.796	0.181	0.074	0.39	79	-0.23	99	4.4	-0.1	79	206	85	70
221	39.977	0.181	0.074	0.39	79	0.07	100	4.4	0	80	206	85	70
222	40.158	0.181	0.074	0.40	79	0.59	99	4.3	-0.1	79	206	85	70
223	40.339	0.181	0.074	0.40	79	0.75	99	5.0	0.7	79	206	85	70
224	40.520	0.181	0.074	0.39	79	-0.21	99	4.3	-0.7	79	206	85	70
225	40.700	0.180	0.074	0.39	79	0.51	99	4.3	0	79	204	85	70
226	40.881	0.181	0.074	0.40	79	0.56	99	4.2	-0.1	79	205	85	70
227	41.062	0.181	0.074	0.39	79	-0.23	99	3.5	-0.7	79	205	85	70
228	41.243	0.181	0.074	0.39	79	0.8	99	4.3	0.8	79	204	85	70
229	41.424	0.181	0.074	0.39	79	-0.36	99	4.6	0.3	79	203	85	70
230	41.605	0.181	0.074	0.40	79	-0.18	99	4.3	-0.3	79	204	85	70

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 2

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/10/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
231	41.786	0.181	0.074	0.39	79	-0.4	99	4.2	-0.1	79	204	85	70
232	41.967	0.181	0.074	0.39	79	0.57	99	4.3	0.1	79	203	85	70
233	42.148	0.181	0.074	0.39	79	0.11	99	2.9	-1.4	79	203	85	69
234	42.329	0.181	0.074	0.40	79	-0.1	99	4.1	1.2	79	203	85	70
235	42.509	0.180	0.074	0.40	79	-0.27	99	4.3	0.2	79	204	85	70
236	42.690	0.181	0.074	0.40	79	-0.11	99	4.2	-0.1	79	203	85	70
237	42.871	0.181	0.074	0.20	79	-0.61	99	3.7	-0.5	79	203	85	70
238	43.052	0.181	0.074	0.40	79	0.89	99	3.9	0.2	79	203	85	69
239	43.233	0.181	0.074	0.39	79	-0.14	99	4.1	0.2	78	204	85	69
240	43.414	0.181	0.074	0.40	79	0.93	99	4.1	0	78	204	85	70
241	43.595	0.181	0.074	0.40	79	0.05	99	4.2	0.1	78	203	85	70
242	43.776	0.181	0.074	0.40	79	0.67	99	4.2	0	78	204	85	70
243	43.957	0.181	0.074	0.39	79	0.09	99	4.0	-0.2	78	204	85	69
244	44.137	0.180	0.074	0.40	79	0.26	99	3.9	-0.1	78	203	85	69
245	44.318	0.181	0.074	0.40	79	-0.34	99	4.1	0.2	78	203	85	70
246	44.499	0.181	0.074	0.40	79	-0.29	99	3.9	-0.2	79	203	85	70
247	44.680	0.181	0.074	0.40	79	0.08	99	3.9	0	78	203	85	69
248	44.861	0.181	0.074	0.40	79	1.01	99	4.0	0.1	78	203	85	69
249	45.042	0.181	0.074	0.40	79	0.69	99	3.8	-0.2	78	203	85	69
250	45.223	0.181	0.074	0.39	79	0.28	99	4.0	0.2	78	203	85	69
251	45.404	0.181	0.074	0.40	79	0.94	99	3.8	-0.2	78	204	85	69
252	45.585	0.181	0.074	0.39	79	-0.01	99	3.9	0.1	78	203	85	69
253	45.765	0.180	0.074	0.39	79	-0.32	99	3.9	0	78	203	85	69
254	45.946	0.181	0.074	0.39	79	0.81	99	3.8	-0.1	78	203	85	69
255	46.127	0.181	0.074	0.40	79	0.47	99	3.7	-0.1	78	202	85	68
256	46.308	0.181	0.074	0.40	79	0.45	99	3.8	0.1	78	203	85	68
257	46.489	0.181	0.074	0.39	79	0.27	99	3.8	0	78	202	85	68
258	46.670	0.181	0.074	0.39	79	0.95	99	3.7	-0.1	78	202	85	68
259	46.851	0.181	0.074	0.40	79	-0.29	99	3.5	-0.2	78	201	85	68
260	47.032	0.181	0.074	0.39	79	-0.21	99	3.7	0.2	78	201	85	68
261	47.213	0.181	0.074	0.39	79	-0.04	99	4.5	0.8	78	201	85	68
262	47.393	0.180	0.074	0.40	79	-0.15	99	3.8	-0.7	78	200	85	68
263	47.574	0.181	0.074	0.40	79	-0.16	99	3.7	-0.1	78	200	85	68

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 2

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/10/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
264	47.755	0.181	0.074	0.39	79	0.32	99	3.6	-0.1	78	200	85	68
265	47.936	0.181	0.074	0.39	79	0.73	99	3.6	0	78	200	85	69
266	48.117	0.181	0.074	0.40	79	0.29	99	3.6	0	78	200	85	69
267	48.298	0.181	0.074	0.39	79	-0.03	99	3.6	0	78	200	85	68
268	48.479	0.181	0.074	0.39	79	-0.2	99	3.6	0	78	200	85	68
269	48.660	0.181	0.074	0.40	79	0.75	99	3.6	0	78	199	85	68
270	48.841	0.181	0.074	0.39	78	-0.22	100	3.5	-0.1	78	199	85	69
271	49.021	0.180	0.074	0.40	78	-0.13	99	3.6	0.1	78	198	85	68
272	49.202	0.181	0.074	0.39	78	-0.07	100	3.5	-0.1	78	198	85	69
273	49.383	0.181	0.074	0.40	78	0.11	100	3.2	-0.3	78	198	85	69
274	49.564	0.181	0.074	0.40	78	0.12	100	3.6	0.4	78	198	85	69
275	49.745	0.181	0.074	0.40	78	0.71	100	3.6	0	78	199	85	68
276	49.926	0.181	0.074	0.39	78	0.45	100	3.5	-0.1	78	198	85	68
277	50.107	0.181	0.074	0.39	78	0.26	100	3.5	0	78	198	85	68
278	50.288	0.181	0.074	0.40	78	0.57	99	3.5	0	77	198	85	69
279	50.469	0.181	0.074	0.39	78	-0.16	100	3.4	-0.1	78	198	85	68
280	50.650	0.181	0.074	0.39	78	-0.49	99	3.4	0	77	198	85	68
281	50.830	0.180	0.074	0.39	78	-0.09	99	3.4	0	78	198	85	69
282	51.011	0.181	0.074	0.40	78	-0.16	100	3.4	0	78	198	85	69
283	51.192	0.181	0.074	0.40	78	-0.34	100	3.2	-0.2	78	198	85	69
284	51.373	0.181	0.074	0.39	78	-0.28	99	3.3	0.1	77	198	85	69
285	51.554	0.181	0.074	0.40	78	0.43	99	3.7	0.4	77	198	85	69
286	51.735	0.181	0.074	0.39	78	0.08	99	3.3	-0.4	77	198	85	69
287	51.916	0.181	0.074	0.39	78	0.96	99	3.3	0	77	198	85	68
288	52.097	0.181	0.074	0.40	78	0.9	99	3.4	0.1	77	198	85	68
289	52.278	0.181	0.074	0.39	78	-0.12	99	3.3	-0.1	77	197	85	70
290	52.458	0.180	0.074	0.39	78	0.93	99	3.3	0	78	197	85	69
291	52.639	0.181	0.074	0.40	78	0.92	100	3.3	0	78	197	85	69
292	52.820	0.181	0.074	0.40	78	0.26	100	3.1	-0.2	78	195	85	69
293	53.001	0.181	0.074	0.40	78	0.08	100	3.2	0.1	78	196	85	69
294	53.182	0.181	0.074	0.40	78	-0.02	100	3.1	-0.1	78	195	85	69
295	53.363	0.181	0.074	0.39	78	-0.06	100	3.1	0	78	195	85	70
296	53.544	0.181	0.074	0.40	78	-0.19	99	3.3	0.2	77	195	85	70

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 2

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/10/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
297	53.725	0.181	0.074	0.39	78	-0.33	99	3.3	0	77	194	85	70
298	53.906	0.181	0.074	0.39	78	1.19	99	3.1	-0.2	77	194	85	69
299	54.086	0.180	0.074	0.40	78	-0.15	99	3.1	0	77	193	85	69
300	54.267	0.181	0.074	0.39	78	1	99	3.1	0	77	192	85	69
301	54.448	0.181	0.074	0.39	78	0.13	99	3.8	0.7	77	192	85	69
302	54.629	0.181	0.074	0.39	78	-0.4	99	3.1	-0.7	77	191	85	68
303	54.810	0.181	0.074	0.40	78	0.17	99	3.2	0.1	77	190	85	69
304	54.991	0.181	0.074	0.40	78	0.56	99	3.1	-0.1	77	190	85	69
305	55.172	0.181	0.074	0.39	78	-0.32	99	3.0	-0.1	77	190	85	68
306	55.353	0.181	0.074	0.40	78	-0.26	99	3.2	0.2	77	190	85	68
307	55.534	0.181	0.074	0.39	78	-0.05	99	3.1	-0.1	77	190	85	68
308	55.714	0.180	0.074	0.39	78	0.68	99	3.1	0	77	189	85	68
309	55.895	0.181	0.074	0.39	78	-0.4	99	3.0	-0.1	76	189	85	68
310	56.076	0.181	0.074	0.40	78	-0.29	99	2.8	-0.2	77	188	85	68
311	56.257	0.181	0.074	0.40	78	-0.15	99	2.9	0.1	76	187	85	68
312	56.438	0.181	0.074	0.39	78	-0.45	99	3.0	0.1	76	188	85	67
313	56.619	0.181	0.074	0.39	78	0.52	99	2.5	-0.5	76	187	85	68
314	56.800	0.181	0.074	0.40	78	0.21	99	3.1	0.6	76	187	85	68
315	56.981	0.181	0.074	0.39	78	0.21	99	2.9	-0.2	76	186	85	68
316	57.162	0.181	0.074	0.39	78	1.12	99	2.9	0	76	185	85	68
317	57.342	0.180	0.074	0.39	78	-0.15	99	2.9	0	76	186	85	68
318	57.523	0.181	0.074	0.39	78	0.74	99	3.0	0.1	76	186	85	68
319	57.704	0.181	0.074	0.39	78	-0.19	99	3.2	0.2	76	185	85	69
320	57.885	0.181	0.074	0.39	78	0.22	99	2.7	-0.5	76	185	85	68
321	58.066	0.181	0.074	0.40	78	0.7	99	2.9	0.2	76	184	85	69
322	58.247	0.181	0.074	0.39	78	0.4	99	3.4	0.5	76	185	85	68
323	58.428	0.181	0.074	0.39	78	0.53	99	2.7	-0.7	76	185	85	68
324	58.609	0.181	0.074	0.39	78	0.04	99	2.8	0.1	76	184	85	68
325	58.790	0.181	0.074	0.40	78	0.06	99	2.8	0	76	184	85	68
326	58.970	0.180	0.074	0.39	78	0	99	2.9	0.1	76	184	85	68
327	59.151	0.181	0.074	0.39	78	0.29	99	3.6	0.7	76	184	85	68
328	59.332	0.181	0.074	0.40	78	-0.05	99	2.8	-0.8	76	185	85	68
329	59.513	0.181	0.074	0.39	78	-0.28	99	2.8	0	76	184	85	68

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 2

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/10/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
330	59.694	0.181	0.074	0.39	78	0.66	99	2.8	0	76	184	85	68
331	59.875	0.181	0.074	0.39	78	0.29	99	2.7	-0.1	76	184	85	68
332	60.056	0.181	0.074	0.39	78	0.1	99	2.8	0.1	76	184	85	68
333	60.237	0.181	0.074	0.40	78	0.78	99	2.8	0	76	184	85	68
334	60.418	0.181	0.074	0.39	78	0.69	99	2.7	-0.1	76	184	85	68
335	60.599	0.181	0.074	0.40	78	0.87	99	2.8	0.1	76	184	85	68
336	60.779	0.180	0.074	0.40	78	1.13	99	2.7	-0.1	76	183	85	68
337	60.960	0.181	0.074	0.39	78	0.36	99	2.4	-0.3	76	183	85	68
338	61.141	0.181	0.074	0.39	78	0.97	99	2.5	0.1	76	183	85	68
339	61.322	0.181	0.074	0.40	78	0.49	99	2.8	0.3	76	184	85	68
340	61.503	0.181	0.074	0.39	78	0.89	99	2.6	-0.2	76	184	85	68
341	61.684	0.181	0.074	0.39	78	0.6	99	2.7	0.1	76	184	85	68
342	61.865	0.181	0.074	0.39	78	-0.33	99	2.6	-0.1	76	183	85	67
343	62.046	0.181	0.074	0.40	78	0.78	99	2.7	0.1	76	183	85	68
344	62.227	0.181	0.074	0.40	78	-0.17	99	2.6	-0.1	76	184	85	68
345	62.407	0.180	0.074	0.39	78	-0.41	99	2.6	0	76	184	85	67
346	62.588	0.181	0.074	0.40	78	0.83	99	2.6	0	75	183	85	68
347	62.769	0.181	0.074	0.39	78	0.86	99	2.6	0	76	182	85	67
348	62.950	0.181	0.074	0.40	78	0.27	99	2.6	0	75	183	85	67
349	63.131	0.181	0.074	0.39	78	0.59	99	3.3	0.7	76	182	85	68
350	63.312	0.181	0.074	0.39	78	0.7	99	2.5	-0.8	76	182	85	67
351	63.493	0.181	0.074	0.39	78	-0.36	99	2.5	0	76	183	85	68
352	63.674	0.181	0.074	0.39	78	-0.03	99	2.5	0	76	183	85	67
353	63.855	0.181	0.074	0.39	78	-0.08	99	2.5	0	76	183	85	67
354	64.035	0.180	0.074	0.39	78	-0.1	99	2.4	-0.1	76	184	85	67
355	64.216	0.181	0.074	0.40	78	-0.17	99	2.5	0.1	76	183	85	68
356	64.397	0.181	0.074	0.40	78	0.04	99	2.7	0.2	75	182	85	68
357	64.578	0.181	0.074	0.39	78	0.7	99	1.8	-0.9	76	182	85	68
358	64.759	0.181	0.074	0.39	78	0.46	99	2.5	0.7	76	183	85	68
359	64.940	0.181	0.074	0.40	78	0.97	99	2.3	-0.2	75	182	85	67
360	65.121	0.181	0.074	0.39	78	0.77	99	2.4	0.1	75	182	85	68
361	65.302	0.181	0.074	0.39	78	-0.22	99	2.4	0	75	182	85	68
362	65.483	0.181	0.074	0.39	78	-0.38	99	2.4	0	75	182	85	67

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 2

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/10/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
363	65.663	0.180	0.074	0.39	78	0.85	99	2.4	0	75	183	85	67
364	65.844	0.181	0.074	0.39	78	0.88	99	2.2	-0.2	75	182	85	67
365	66.025	0.181	0.074	0.39	78	0.26	99	2.2	0	75	181	85	68
366	66.206	0.181	0.074	0.39	78	0.22	99	2.3	0.1	75	182	85	68
367	66.387	0.181	0.074	0.40	78	0.45	99	2.3	0	75	182	84	67
368	66.568	0.181	0.074	0.40	78	1.26	99	2.3	0	75	181	85	67
369	66.749	0.181	0.074	0.39	78	0.92	99	2.3	0	75	181	85	67
370	66.930	0.181	0.074	0.39	78	0.22	99	2.2	-0.1	75	180	85	67
371	67.111	0.181	0.074	0.39	78	0.57	99	2.2	0	75	181	85	67
372	67.291	0.180	0.074	0.39	78	0.87	99	2.4	0.2	75	181	85	67
373	67.472	0.181	0.074	0.39	78	0.02	99	2.2	-0.2	75	181	85	67
374	67.653	0.181	0.074	0.40	78	-0.02	99	2.3	0.1	75	181	85	67
375	67.834	0.181	0.074	0.39	78	0.5	99	2.2	-0.1	75	180	85	67
376	68.015	0.181	0.074	0.40	78	0.67	99	2.1	-0.1	75	180	85	67
377	68.196	0.181	0.074	0.39	78	0.41	99	2.2	0.1	75	179	85	67
378	68.377	0.181	0.074	0.39	78	0.93	99	2.2	0	75	179	85	67
379	68.558	0.181	0.074	0.40	78	0.93	99	1.0	-1.2	75	177	85	67
380	68.739	0.181	0.074	0.39	78	0.55	99	2.1	1.1	75	178	85	67
381	68.920	0.181	0.074	0.39	78	-0.44	99	2.6	0.5	75	177	85	67
382	69.100	0.180	0.074	0.39	78	0.51	99	2.2	-0.4	75	177	85	67
383	69.281	0.181	0.074	0.39	77	0.9	99	2.0	-0.2	75	177	85	67
384	69.462	0.181	0.074	0.39	77	-0.09	99	2.2	0.2	75	177	85	67
385	69.643	0.181	0.074	0.40	77	0.21	99	2.1	-0.1	75	177	85	67
386	69.824	0.181	0.074	0.39	77	0.07	99	2.2	0.1	75	177	85	67
387	70.005	0.181	0.074	0.40	77	-0.43	99	2.8	0.6	75	177	85	68
388	70.186	0.181	0.074	0.40	77	0.93	99	2.1	-0.7	75	177	85	68
389	70.367	0.181	0.074	0.39	77	0.16	99	2.0	-0.1	75	176	85	67
390	70.548	0.181	0.074	0.39	77	-0.14	99	2.4	0.4	75	176	85	67
391	70.728	0.180	0.074	0.40	77	-0.11	99	2.0	-0.4	75	176	85	67
392	70.909	0.181	0.074	0.39	77	-0.3	99	2.1	0.1	74	175	85	67
393	71.090	0.181	0.074	0.39	77	0.73	99	1.9	-0.2	74	175	85	67
394	71.271	0.181	0.074	0.39	77	0.52	99	2.1	0.2	75	176	85	68
395	71.452	0.181	0.074	0.39	77	-0.35	99	2.0	-0.1	75	175	85	67

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 2

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/10/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
396	71.633	0.181	0.074	0.40	77	0.94	99	1.9	-0.1	74	175	84	67
397	71.814	0.181	0.074	0.39	77	-0.3	99	0.6	-1.3	74	175	84	67
398	71.995	0.181	0.074	0.39	77	0.94	99	1.9	1.3	74	174	84	67
399	72.176	0.181	0.074	0.39	77	0.22	99	1.9	0	74	174	84	67
400	72.356	0.180	0.074	0.39	77	-0.39	99	1.9	0	75	173	84	67
401	72.537	0.181	0.074	0.39	77	0.23	99	1.9	0	74	174	84	67
402	72.718	0.181	0.074	0.39	77	0.14	99	1.9	0	74	174	84	67
403	72.899	0.181	0.074	0.39	77	-0.39	99	1.9	0	74	174	85	67
404	73.080	0.181	0.074	0.39	77	0.21	99	1.9	0	75	174	85	67
405	73.261	0.181	0.074	0.39	77	0.3	99	2.0	0.1	74	173	85	67
406	73.442	0.181	0.074	0.40	77	-0.13	99	1.9	-0.1	74	173	85	67
407	73.623	0.181	0.074	0.39	77	-0.47	99	2.0	0.1	74	173	85	66
408	73.804	0.181	0.074	0.39	77	0.21	99	1.8	-0.2	74	172	85	67
409	73.984	0.180	0.074	0.40	77	-0.23	99	1.9	0.1	74	173	85	67
410	74.165	0.181	0.074	0.40	77	-0.22	99	1.9	0	74	173	85	67
411	74.346	0.181	0.074	0.39	77	0.47	99	1.8	-0.1	74	172	85	67
412	74.527	0.181	0.074	0.39	77	-0.16	99	1.8	0	74	172	85	67
413	74.708	0.181	0.074	0.40	77	-0.32	99	1.8	0	74	172	85	67
414	74.889	0.181	0.074	0.39	77	0.09	99	1.8	0	74	172	85	67
415	75.070	0.181	0.074	0.39	77	-0.05	99	1.8	0	74	172	85	66
416	75.251	0.181	0.074	0.39	77	0.17	99	1.8	0	74	172	85	67
417	75.432	0.181	0.074	0.40	77	0.28	99	1.8	0	74	171	85	67
418	75.612	0.180	0.074	0.40	77	0.98	99	1.7	-0.1	74	171	85	67
419	75.793	0.181	0.074	0.39	77	0.66	99	1.7	0	74	171	85	66
420	75.974	0.181	0.074	0.40	77	0.57	99	1.7	0	74	172	85	67
421	76.155	0.181	0.074	0.40	77	0.83	99	1.7	0	74	171	85	66
422	76.336	0.181	0.074	0.39	77	0.47	99	1.7	0	74	171	85	67
423	76.517	0.181	0.074	0.39	77	0.48	99	1.6	-0.1	74	171	85	67
424	76.698	0.181	0.074	0.40	77	0.24	99	1.7	0.1	74	171	85	67
425	76.879	0.181	0.074	0.40	77	0.61	99	1.0	-0.7	74	171	85	66
426	77.060	0.181	0.074	0.39	77	0.24	99	1.6	0.6	74	171	85	67
427	77.240	0.180	0.074	0.39	77	-0.01	99	1.6	0	74	170	85	67
428	77.421	0.181	0.074	0.39	77	0.78	99	1.6	0	74	171	84	66

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 2

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/10/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
429	77.602	0.181	0.074	0.40	77	0.91	99	1.5	-0.1	74	170	85	67
430	77.783	0.181	0.074	0.40	77	0.55	99	2.1	0.6	74	170	85	66
431	77.964	0.181	0.074	0.40	77	0.9	99	1.6	-0.5	74	170	85	66
432	78.145	0.181	0.074	0.40	77	-0.09	99	1.7	0.1	74	170	84	66
433	78.326	0.181	0.074	0.39	77	1.02	99	1.8	0.1	74	170	84	66
434	78.507	0.181	0.074	0.39	77	0.65	99	1.5	-0.3	74	169	84	66
435	78.688	0.181	0.074	0.40	77	-0.19	99	1.7	0.2	74	169	84	66
436	78.869	0.181	0.074	0.39	77	0.93	99	1.6	-0.1	74	168	84	66
437	79.049	0.180	0.074	0.39	77	0.17	99	1.5	-0.1	74	168	84	66
438	79.230	0.181	0.074	0.40	77	0.79	99	1.6	0.1	74	169	84	66
439	79.411	0.181	0.074	0.39	77	0.73	99	1.6	0	74	169	84	66
440	79.592	0.181	0.074	0.40	77	0.11	99	1.4	-0.2	73	169	84	66
441	79.773	0.181	0.074	0.39	77	-0.37	99	1.4	0	73	168	84	67
442	79.954	0.181	0.074	0.40	77	0.24	99	1.5	0.1	73	168	84	66
443	80.135	0.181	0.074	0.40	77	0.89	99	1.5	0	73	168	84	67
444	80.316	0.181	0.074	0.40	77	0.68	99	1.5	0	73	168	84	66
445	80.497	0.181	0.074	0.39	77	0.15	99	1.5	0	73	167	84	66
446	80.677	0.180	0.074	0.40	77	0.65	99	1.5	0	73	167	84	67
447	80.858	0.181	0.074	0.39	77	0.26	99	1.4	-0.1	73	168	84	66
448	81.039	0.181	0.074	0.39	77	-0.22	99	1.5	0.1	73	168	84	66
449	81.220	0.181	0.074	0.39	77	0.15	99	1.8	0.3	73	168	84	67
450	81.401	0.181	0.074	0.40	77	-0.23	99	1.4	-0.4	73	168	84	66
451	81.582	0.181	0.074	0.39	77	-0.16	99	1.3	-0.1	73	167	84	66
452	81.763	0.181	0.074	0.40	77	0.73	99	1.4	0.1	73	167	84	67
453	81.944	0.181	0.074	0.40	77	0.86	99	1.3	-0.1	73	167	84	66
454	82.125	0.181	0.074	0.40	77	-0.34	99	1.4	0.1	73	167	84	66
455	82.305	0.180	0.074	0.39	77	0.84	99	1.4	0	73	167	84	67
456	82.486	0.181	0.074	0.39	77	0.92	99	1.3	-0.1	73	166	84	66
457	82.667	0.181	0.074	0.39	77	0.24	99	1.3	0	73	166	84	66
458	82.848	0.181	0.074	0.39	77	0.26	99	1.3	0	73	167	84	67
459	83.029	0.181	0.074	0.39	77	0.71	99	1.3	0	73	166	84	66
460	83.210	0.181	0.074	0.40	77	0.54	99	1.3	0	73	166	84	66
461	83.391	0.181	0.074	0.40	77	0.1	99	1.3	0	73	165	84	66

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 2

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/10/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
462	83.572	0.181	0.074	0.40	77	0.77	99	1.3	0	73	165	84	66
463	83.753	0.181	0.074	0.40	77	0.85	99	1.3	0	73	165	84	66
464	83.933	0.180	0.074	0.39	77	-0.4	99	1.2	-0.1	73	165	84	66
465	84.114	0.181	0.074	0.40	77	-0.28	99	1.3	0.1	73	166	84	66
466	84.295	0.181	0.074	0.39	77	0.93	99	1.0	-0.3	73	167	84	66
467	84.476	0.181	0.074	0.39	77	0.8	99	1.2	0.2	73	166	84	66
468	84.657	0.181	0.074	0.40	77	0.82	99	1.3	0.1	73	165	84	66
469	84.838	0.181	0.074	0.40	77	-0.26	99	0.9	-0.4	73	166	84	66
470	85.019	0.181	0.074	0.39	77	0.87	99	1.1	0.2	73	166	84	66
471	85.200	0.181	0.074	0.39	77	0.16	99	1.1	0	73	165	84	66
472	85.381	0.181	0.074	0.40	77	-0.2	99	1.0	-0.1	73	165	84	66
473	85.561	0.180	0.074	0.40	77	0.86	99	1.2	0.2	73	166	84	66
474	85.742	0.181	0.074	0.39	77	0.71	99	1.1	-0.1	73	166	84	66
475	85.923	0.181	0.074	0.40	77	0.05	99	1.1	0	73	165	84	66
476	86.104	0.181	0.074	0.40	77	0.79	99	1.1	0	73	165	84	66
477	86.285	0.181	0.074	0.39	77	-0.38	99	1.1	0	73	166	84	66
478	86.466	0.181	0.074	0.39	77	-0.41	99	1.2	0.1	73	165	84	66
479	86.647	0.181	0.074	0.40	77	-0.32	99	1.1	-0.1	73	166	84	66
480	86.828	0.181	0.074	0.40	77	0.66	99	1.1	0	73	166	84	66
481	87.009	0.181	0.074	0.40	77	0.44	99	0.9	-0.2	73	165	84	66
482	87.190	0.181	0.074	0.39	77	0.08	99	1.1	0.2	73	165	84	66
483	87.370	0.180	0.074	0.40	77	0.8	99	1.4	0.3	73	164	84	66
484	87.551	0.181	0.074	0.40	77	0.84	99	1.0	-0.4	73	164	84	66
485	87.732	0.181	0.074	0.40	77	-0.15	99	1.0	0	73	164	84	66
486	87.913	0.181	0.074	0.39	77	-0.35	99	1.4	0.4	73	164	84	66
487	88.094	0.181	0.074	0.39	77	0.96	99	1.0	-0.4	73	163	84	66
488	88.275	0.181	0.074	0.39	77	0.14	99	1.0	0	73	164	84	66
489	88.456	0.181	0.074	0.39	77	0.23	99	1.0	0	73	163	84	66
490	88.637	0.181	0.074	0.40	77	0.4	99	1.0	0	73	163	84	66
491	88.818	0.181	0.074	0.40	77	0.19	99	1.0	0	73	163	84	66
492	88.998	0.180	0.074	0.39	77	-0.27	99	1.4	0.4	72	164	84	66
493	89.179	0.181	0.074	0.40	77	-0.32	99	1.0	-0.4	73	163	84	66
494	89.360	0.181	0.074	0.40	77	0.71	99	0.9	-0.1	72	163	84	66

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 2

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/10/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
495	89.541	0.181	0.074	0.40	77	0.55	99	0.8	-0.1	73	163	84	66
496	89.722	0.181	0.074	0.39	77	-0.15	99	0.9	0.1	73	162	84	66
497	89.903	0.181	0.074	0.40	77	-0.02	99	0.5	-0.4	72	162	84	66
498	90.084	0.181	0.074	0.39	77	0.13	99	1.2	0.7	72	162	84	66
499	90.265	0.181	0.074	0.39	77	0.04	99	0.9	-0.3	72	162	84	66
500	90.446	0.181	0.074	0.39	77	-0.29	99	0.8	-0.1	73	162	84	66
501	90.626	0.180	0.074	0.40	77	0.46	99	1.4	0.6	72	162	84	66
502	90.807	0.181	0.074	0.40	77	-0.31	99	0.6	-0.8	72	163	84	66
503	90.988	0.181	0.074	0.39	77	-0.35	99	0.8	0.2	72	162	84	65
504	91.169	0.181	0.074	0.39	77	0.24	99	1.0	0.2	72	162	84	65
505	91.350	0.181	0.074	0.40	77	-0.43	99	0.9	-0.1	72	162	84	66
506	91.531	0.181	0.074	0.39	77	0.76	99	0.7	-0.2	72	162	84	66
507	91.712	0.181	0.074	0.39	77	0.74	99	0.8	0.1	72	162	84	66
508	91.893	0.181	0.074	0.40	77	-0.25	99	0.8	0	72	162	84	66
509	92.074	0.181	0.074	0.40	77	0.95	99	0.9	0.1	72	162	84	65
510	92.254	0.180	0.074	0.39	77	-0.18	99	0.8	-0.1	72	162	84	66
511	92.435	0.181	0.074	0.39	77	0.44	99	0.7	-0.1	72	162	84	66
512	92.616	0.181	0.074	0.40	77	-0.06	99	0.7	0	72	161	84	65
513	92.797	0.181	0.074	0.39	77	0.41	99	0.7	0	72	162	84	66
514	92.978	0.181	0.074	0.39	77	0.68	99	0.8	0.1	72	161	84	65
515	93.159	0.181	0.074	0.39	77	0.82	99	0.6	-0.2	72	161	84	65
516	93.340	0.181	0.074	0.39	77	0.92	99	0.7	0.1	72	161	84	65
517	93.521	0.181	0.074	0.39	77	-0.25	99	0.7	0	72	161	84	65
518	93.702	0.181	0.074	0.39	77	-0.25	99	1.3	0.6	72	161	84	66
519	93.882	0.180	0.074	0.39	77	-0.06	99	0.6	-0.7	72	160	84	66
520	94.063	0.181	0.074	0.39	77	0.18	99	0.8	0.2	72	162	84	66
521	94.244	0.181	0.074	0.39	77	0.62	99	0.7	-0.1	72	162	84	66
522	94.425	0.181	0.074	0.39	77	-0.34	99	0.7	0	72	161	84	66
523	94.606	0.181	0.074	0.39	77	0.02	99	0.7	0	72	162	84	66
524	94.787	0.181	0.074	0.39	77	0.84	99	0.3	-0.4	72	162	84	65
525	94.968	0.181	0.074	0.39	77	0.11	99	0.7	0.4	72	162	84	66
526	95.149	0.181	0.074	0.40	77	-0.18	99	0.0	-0.7	72	162	84	66
527	95.330	0.181	0.074	0.39	77	-0.32	99	0.6	0.6	72	162	84	66

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 2

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/10/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
528	95.510	0.180	0.074	0.39	77	0.86	99	0.6	0	72	162	84	65
529	95.691	0.181	0.074	0.39	77	-0.35	99	0.5	-0.1	72	161	84	65
530	95.872	0.181	0.074	0.39	77	0.97	99	0.6	0.1	72	161	84	65
531	96.053	0.181	0.074	0.39	77	-0.19	99	0.7	0.1	72	161	84	65
532	96.234	0.181	0.074	0.39	77	0.64	99	1.4	0.7	72	161	84	65
533	96.415	0.181	0.074	0.40	77	-0.26	99	0.5	-0.9	72	161	84	66
534	96.596	0.181	0.074	0.40	77	0.81	99	0.6	0.1	72	161	84	66
535	96.777	0.181	0.074	0.39	76	-0.38	99	0.5	-0.1	72	161	84	65
536	96.958	0.181	0.074	0.39	76	0.14	99	0.5	0	72	161	84	65
537	97.139	0.181	0.074	0.40	76	-0.25	99	0.6	0.1	72	161	84	65
538	97.319	0.180	0.074	0.39	76	0.43	99	0.5	-0.1	72	162	84	65
539	97.500	0.181	0.074	0.39	76	-0.1	99	0.5	0	72	161	84	65
540	97.681	0.181	0.074	0.39	76	0.52	99	0.8	0.3	72	161	84	66
541	97.862	0.181	0.074	0.39	76	0.78	99	0.4	-0.4	72	161	84	65
542	98.043	0.181	0.074	0.39	76	0.87	99	0.5	0.1	72	161	84	65
543	98.224	0.181	0.074	0.39	76	-0.38	99	0.5	0	72	161	84	65
544	98.405	0.181	0.074	0.40	76	-0.05	99	0.4	-0.1	72	159	84	66
545	98.586	0.181	0.074	0.40	76	0.9	99	0.5	0.1	72	160	84	65
546	98.767	0.181	0.074	0.39	76	0.21	99	0.3	-0.2	72	160	84	66
547	98.947	0.180	0.074	0.39	76	0.26	99	0.0	-0.3	72	159	84	65
548	99.128	0.181	0.074	0.40	76	0.03	99	0.4	0.4	72	160	84	65
549	99.309	0.181	0.074	0.39	76	0.05	99	0.4	0	72	159	84	65
550	99.490	0.181	0.074	0.39	76	0.05	99	0.3	-0.1	72	159	84	65
551	99.671	0.181	0.074	0.39	76	0.87	99	0.3	0	72	158	84	65
552	99.852	0.181	0.074	0.39	76	-0.42	99	0.4	0.1	72	157	84	65
553	100.033	0.181	0.074	0.39	76	0.75	99	0.3	-0.1	72	157	84	65
554	100.214	0.181	0.074	0.39	76	0.12	99	0.3	0	72	157	84	65
555	100.395	0.181	0.074	0.40	76	0.32	99	0.4	0.1	72	157	84	65
556	100.575	0.180	0.074	0.39	76	-0.41	99	0.3	-0.1	71	157	84	65
557	100.756	0.181	0.074	0.39	76	-0.07	99	0.4	0.1	71	156	84	65
558	100.937	0.181	0.074	0.40	76	0.97	99	0.3	-0.1	71	156	84	65
559	101.118	0.181	0.074	0.39	76	-0.4	99	0.2	-0.1	72	155	84	65
560	101.299	0.181	0.074	0.39	76	0.02	99	0.3	0.1	72	154	84	65

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 2

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/10/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
561	101.480	0.181	0.074	0.40	76	-0.39	99	0.3	0	71	155	84	65
562	101.661	0.181	0.074	0.40	76	0.21	99	0.3	0	71	155	84	65
563	101.842	0.181	0.074	0.39	76	0.88	99	0.3	0	71	155	84	65
564	102.023	0.181	0.074	0.39	76	0.71	99	0.2	-0.1	71	154	84	65
565	102.203	0.180	0.074	0.39	76	-0.2	99	0.3	0.1	71	153	84	65
566	102.384	0.181	0.074	0.40	76	0.27	99	0.3	0	71	153	84	65
567	102.565	0.181	0.074	0.39	76	0.84	99	0.3	0	71	153	84	65
568	102.746	0.181	0.074	0.39	76	0.45	99	0.3	0	71	152	84	66
569	102.927	0.181	0.074	0.40	76	0.8	99	0.2	-0.1	71	152	84	65
570	103.108	0.181	0.074	0.40	76	-0.28	99	0.3	0.1	71	152	84	65
571	103.289	0.181	0.074	0.39	76	-0.05	99	0.2	-0.1	71	151	84	65
572	103.470	0.181	0.074	0.40	76	0.51	99	0.3	0.1	71	151	84	65
573	103.651	0.181	0.074	0.40	76	-0.41	99	0.3	0	71	151	84	65
574	103.831	0.180	0.074	0.39	76	0.82	99	0.0	-0.3	71	151	84	65
575	104.012	0.181	0.074	0.39	76	0.75	99	0.2	0.2	71	151	84	65
576	104.193	0.181	0.074	0.39	76	-0.3	99	0.2	0	71	152	84	65
577	104.374	0.181	0.074	0.39	76	0.95	99	0.2	0	71	152	84	65
578	104.555	0.181	0.074	0.39	76	0.89	99	0.2	0	71	153	84	65
579	104.736	0.181	0.074	0.40	76	0.54	99	0.2	0	71	152	84	65
580	104.917	0.181	0.074	0.40	76	-0.2	99	0.2	0	71	152	84	65
581	105.098	0.181	0.074	0.40	76	0.88	99	0.9	0.7	71	152	84	65
582	105.279	0.181	0.074	0.39	76	-0.09	99	0.1	-0.8	71	151	84	65
583	105.460	0.181	0.074	0.39	76	0.92	99	0.2	0.1	71	150	84	65
584	105.640	0.180	0.074	0.39	76	0.81	99	0.8	0.6	71	149	84	65
585	105.821	0.181	0.074	0.39	76	-0.34	99	0.1	-0.7	71	149	84	65
586	106.002	0.181	0.074	0.39	76	0.04	99	0.1	0	71	149	84	65
587	106.183	0.181	0.074	0.40	76	0.77	99	0.3	0.2	71	149	84	65
588	106.364	0.181	0.074	0.39	76	0.86	99	0.0	-0.3	71	148	84	65
589	106.545	0.181	0.074	0.39	76	0.03	99	0.1	0.1	71	148	84	65
590	106.726	0.181	0.074	0.40	76	0.79	99	0.1	0	71	147	84	65
591	106.907	0.181	0.074	0.40	76	-0.06	99	0.1	0	71	147	84	65
592	107.088	0.181	0.074	0.39	76	0.2	99	0.1	0	71	146	84	65
593	107.268	0.180	0.074	0.39	76	-0.35	99	0.0	-0.1	71	146	84	64

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 2

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/10/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
594	107.449	0.181	0.074	0.40	76	0.85	99	0.5	0.5	71	145	84	64
595	107.630	0.181	0.074	0.39	76	-0.38	99	0.2	-0.3	71	145	84	64
596	107.811	0.181	0.074	0.39	76	0.92	99	0.1	-0.1	70	144	84	65
597	107.992	0.181	0.074	0.40	76	0.74	99	0.2	0.1	70	144	84	65
598	108.173	0.181	0.074	0.40	76	0.88	99	0.1	-0.1	70	144	84	65
599	108.354	0.181	0.074	0.40	76	0.06	99	0.1	0	70	144	84	65
600	108.535	0.181	0.074	0.39	76	0.24	99	0.1	0	70	143	84	64
601	108.716	0.181	0.074	0.40	76	0.56	99	0.0	-0.1	70	142	84	65
602	108.896	0.180	0.074	0.39	76	0.72	99	0.1	0.1	70	142	84	65
603	109.077	0.181	0.074	0.39	76	0.94	99	0.1	0	70	142	84	64
604	109.258	0.181	0.074	0.39	76	0.83	99	0.6	0.5	70	142	84	65
605	109.439	0.181	0.074	0.40	76	0.8	99	0.0	-0.6	70	142	84	65
606	109.620	0.181	0.074	0.40	76	0.88	99	0.1	0.1	70	143	84	64
Avg/Tot	109.620	0.181	0.074	0.39	77	0.28	100			82	233	85	69.2

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 2

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/10/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
0	0.000		0.00	70	0		90	0.000	1.82	0.39
1	0.177	0.177	0.39	70	0.93	104	88	-0.060	0.73	0.18
2	0.355	0.178	0.39	70	1.28	103	80	-0.060	1.98	0.73
3	0.532	0.177	0.38	70	2.3	102	87	-0.060	3.01	0.59
4	0.710	0.178	0.39	70	1.92	103	90	-0.060	4.03	0.57
5	0.887	0.177	0.40	70	0.22	102	88	-0.060	5.98	0.45
6	1.065	0.178	0.39	70	2.28	103	86	-0.070	7.07	0.44
7	1.242	0.177	0.41	70	1.04	103	84	-0.070	8.31	0.41
8	1.419	0.177	0.40	70	2.51	103	83	-0.080	8.90	0.37
9	1.597	0.178	0.41	70	2.43	104	82	-0.070	9.56	0.36
10	1.774	0.177	0.39	70	2.51	104	82	-0.080	10.33	0.33
11	1.952	0.178	0.40	70	2.49	105	82	-0.080	10.84	0.31
12	2.129	0.177	0.40	70	2.03	104	84	-0.080	11.89	0.88
13	2.307	0.178	0.39	70	2.81	105	88	-0.080	12.17	0.90
14	2.484	0.177	0.33	70	5.98	105	88	-0.080	12.17	1.56
15	2.661	0.177	0.15	70	9.3	105	85	-0.090	12.67	1.33
16	2.839	0.178	0.50	70	2.75	105	82	-0.080	11.41	2.61
17	3.016	0.177	0.40	70	2.19	104	83	-0.080	10.32	0.36
18	3.194	0.178	0.40	70	1.61	104	87	-0.060	8.21	0.31
19	3.371	0.177	0.40	70	1.41	103	89	-0.070	8.37	0.28
20	3.549	0.178	0.40	70	1.28	103	88	-0.060	8.06	0.23
21	3.726	0.177	0.40	70	1.58	103	86	-0.070	8.38	0.24
22	3.903	0.177	0.40	70	2.46	103	85	-0.070	8.44	0.29
23	4.081	0.178	0.40	71	2.61	103	83	-0.070	9.03	0.47
24	4.258	0.177	0.40	71	1.91	102	83	-0.070	9.11	0.52
25	4.436	0.178	0.40	71	2.66	103	86	-0.070	9.14	0.47
26	4.613	0.177	0.40	71	1.23	102	90	-0.070	9.24	0.45
27	4.791	0.178	0.41	71	2.11	103	90	-0.070	9.34	0.42
28	4.968	0.177	0.40	71	1.08	102	87	-0.070	9.27	0.55
29	5.145	0.177	0.41	71	1.61	102	86	-0.070	9.53	0.54
30	5.323	0.178	0.40	71	1.86	103	84	-0.070	9.37	0.62
31	5.500	0.177	0.41	71	2.08	102	83	-0.070	9.36	0.67

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 2

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/10/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
32	5.678	0.178	0.40	71	1.52	103	82	-0.070	9.55	0.73
33	5.855	0.177	0.40	71	1.6	102	83	-0.060	9.55	0.70
34	6.033	0.178	0.39	72	1.3	103	84	-0.070	9.43	0.63
35	6.210	0.177	0.39	72	1.31	102	83	-0.070	9.29	0.65
36	6.387	0.177	0.40	72	2.63	102	82	-0.070	9.42	0.66
37	6.565	0.178	0.39	72	2.53	103	81	-0.070	9.38	0.71
38	6.742	0.177	0.40	72	0.93	102	84	-0.080	9.41	0.68
39	6.920	0.178	0.39	72	1.3	103	87	-0.070	9.62	0.58
40	7.097	0.177	0.42	72	1.07	102	87	-0.070	9.52	0.59
41	7.275	0.178	0.42	72	2.7	103	86	-0.070	9.90	0.58
42	7.452	0.177	0.41	72	0.96	102	84	-0.070	10.05	0.53
43	7.629	0.177	0.42	72	2.28	102	84	-0.070	9.95	0.63
44	7.807	0.178	0.41	72	1.56	103	84	-0.060	9.96	0.30
45	7.984	0.177	0.41	72	1.58	102	84	-0.070	9.65	0.25
46	8.162	0.178	0.42	72	2.63	103	84	-0.070	9.67	0.18
47	8.339	0.177	0.42	73	1.43	102	85	-0.070	9.60	0.20
48	8.517	0.178	0.41	73	2.55	102	85	-0.060	9.45	0.20
49	8.694	0.177	0.41	73	1.2	102	86	-0.060	9.13	0.24
50	8.872	0.178	0.42	73	0.83	102	87	-0.060	9.27	0.24
51	9.049	0.177	0.41	73	2.76	102	87	-0.070	9.26	0.24
52	9.226	0.177	0.41	73	2.61	102	87	-0.070	9.07	0.26
53	9.404	0.178	0.41	73	1.65	102	87	-0.060	9.12	0.28
54	9.581	0.177	0.40	73	0.93	102	86	-0.060	9.00	0.30
55	9.759	0.178	0.41	73	0.98	102	85	-0.070	9.02	0.25
56	9.936	0.177	0.41	73	0.92	102	84	-0.060	9.13	0.22
57	10.114	0.178	0.40	73	0.78	102	84	-0.060	9.11	0.22
58	10.291	0.177	0.41	73	2.6	102	84	-0.070	9.30	0.25
59	10.468	0.177	0.40	73	1.96	102	85	-0.060	9.22	0.24
60	10.646	0.178	0.40	73	1.43	102	85	-0.070	9.32	0.23
61	10.823	0.177	0.40	73	2.41	102	86	-0.060	9.38	0.29
62	11.001	0.178	0.40	73	2.14	102	87	-0.060	9.54	0.28
63	11.178	0.177	0.40	73	1.19	102	87	-0.060	9.79	0.25

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Job #: 19-468
Model: ST210GL
Tracking #: 0026
Run #: 2
Technician: SJB
Date: 4/10/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
64	11.356	0.178	0.40	74	2.33	102	87	-0.070	9.92	0.27
65	11.533	0.177	0.40	74	1.37	101	88	-0.070	9.96	0.35
66	11.710	0.177	0.39	74	2.6	102	88	-0.070	10.03	0.38
67	11.888	0.178	0.39	74	1.69	102	88	-0.070	10.19	0.31
68	12.065	0.177	0.40	74	2.84	102	87	-0.070	10.00	0.31
69	12.243	0.178	0.39	74	1.62	102	86	-0.070	9.94	0.25
70	12.420	0.177	0.39	74	2.33	102	86	-0.070	9.96	0.25
71	12.598	0.178	0.40	74	1.67	102	85	-0.070	9.75	0.23
72	12.775	0.177	0.40	74	1.62	102	84	-0.070	9.64	0.27
73	12.952	0.177	0.40	74	1.73	102	83	-0.070	9.69	0.34
74	13.130	0.178	0.39	74	2.93	102	82	-0.070	9.65	0.31
75	13.307	0.177	0.39	74	1.23	102	82	-0.070	9.72	0.35
76	13.485	0.178	0.39	74	1.85	102	83	-0.070	9.95	0.36
77	13.662	0.177	0.40	74	2.67	102	83	-0.070	9.98	0.36
78	13.840	0.178	0.39	74	0.9	102	83	-0.060	10.12	0.43
79	14.017	0.177	0.39	74	1	102	84	-0.060	9.98	0.42
80	14.194	0.177	0.39	74	2.85	102	84	-0.070	9.93	0.38
81	14.372	0.178	0.39	74	2.86	102	84	-0.060	9.88	0.33
82	14.549	0.177	0.39	74	1.71	102	84	-0.070	9.35	0.19
83	14.727	0.178	0.40	74	2.6	102	85	-0.060	9.26	0.24
84	14.904	0.177	0.38	74	1.14	101	85	-0.070	9.27	0.16
85	15.082	0.178	0.39	74	2.87	102	85	-0.070	9.26	0.21
86	15.259	0.177	0.39	74	2.69	101	85	-0.060	9.13	0.15
87	15.436	0.177	0.39	74	2.62	101	85	-0.060	9.02	0.16
88	15.614	0.178	0.39	74	1.57	102	85	-0.060	9.28	0.18
89	15.791	0.177	0.39	74	1.61	101	85	-0.070	9.04	0.21
90	15.969	0.178	0.39	74	2.92	102	85	-0.070	9.21	0.21
91	16.146	0.177	0.40	75	0.6	101	85	-0.060	9.06	0.21
92	16.324	0.178	0.40	75	2.04	102	85	-0.070	9.00	0.19
93	16.501	0.177	0.39	75	1.6	101	85	-0.070	9.06	0.20
94	16.678	0.177	0.40	75	1.46	101	85	-0.060	8.89	0.17
95	16.856	0.178	0.38	75	0.68	102	85	-0.060	8.98	0.17

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Job #: 19-468
Model: ST210GL
Tracking #: 0026
Run #: 2
Technician: SJB
Date: 4/10/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
96	17.033	0.177	0.39	75	1.96	101	85	-0.070	8.81	0.18
97	17.211	0.178	0.39	75	2.48	102	85	-0.060	8.79	0.21
98	17.388	0.177	0.39	75	1.51	101	85	-0.060	8.84	0.19
99	17.566	0.178	0.40	75	2.49	102	85	-0.060	8.97	0.17
100	17.743	0.177	0.39	75	1.72	101	85	-0.060	9.02	0.18
101	17.920	0.177	0.39	75	2.88	101	86	-0.060	9.20	0.22
102	18.098	0.178	0.39	75	2.15	102	86	-0.060	9.33	0.14
103	18.275	0.177	0.39	75	2.66	101	87	-0.070	9.11	0.16
104	18.453	0.178	0.38	75	2.54	102	88	-0.070	9.10	0.15
105	18.630	0.177	0.39	75	1.15	101	88	-0.050	8.77	0.17
106	18.808	0.178	0.38	75	2.47	102	89	-0.060	8.80	0.16
107	18.985	0.177	0.39	75	1.72	101	89	-0.060	8.62	0.18
108	19.162	0.177	0.42	75	2.79	101	89	-0.060	8.39	0.15
109	19.340	0.178	0.41	75	3.04	101	89	-0.060	8.36	0.17
110	19.517	0.177	0.41	75	1.73	101	89	-0.060	8.39	0.15
111	19.695	0.178	0.41	75	2.6	101	89	-0.060	8.44	0.16
112	19.872	0.177	0.42	75	2.91	101	89	-0.060	8.32	0.13
113	20.050	0.178	0.41	75	2.87	101	89	-0.060	8.26	0.16
114	20.227	0.177	0.42	75	2.98	101	89	-0.050	8.25	0.16
115	20.404	0.177	0.42	75	1.15	101	88	-0.060	8.14	0.14
116	20.582	0.178	0.42	75	2.88	101	88	-0.050	8.17	0.13
117	20.759	0.177	0.42	75	2.93	101	88	-0.060	8.24	0.18
118	20.937	0.178	0.41	75	2.88	101	87	-0.060	8.25	0.18
119	21.114	0.177	0.41	75	1.71	101	87	-0.070	8.32	0.19
120	21.292	0.178	0.42	75	2.41	101	86	-0.050	8.00	0.42
121	21.469	0.177	0.42	75	2.7	101	87	-0.050	8.09	0.46
122	21.646	0.177	0.42	75	1.28	101	86	-0.060	8.13	0.48
123	21.824	0.178	0.42	75	2.02	101	85	-0.050	8.00	0.50
124	22.001	0.177	0.42	75	2.38	101	84	-0.060	8.09	0.47
125	22.179	0.178	0.42	75	1.78	101	83	-0.050	8.08	0.51
126	22.356	0.177	0.42	75	1.09	101	82	-0.060	8.09	0.53
127	22.534	0.178	0.42	75	1.35	101	81	-0.060	8.01	0.52

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Job #: 19-468
Model: ST210GL
Tracking #: 0026
Run #: 2
Technician: SJB
Date: 4/10/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
128	22.711	0.177	0.41	75	1.76	101	81	-0.060	8.08	0.57
129	22.888	0.177	0.42	75	1.65	101	82	-0.060	7.97	0.57
130	23.066	0.178	0.42	75	0.93	101	82	-0.060	8.03	0.58
131	23.243	0.177	0.42	75	1.2	101	82	-0.060	8.05	0.60
132	23.421	0.178	0.42	75	1.52	101	82	-0.060	7.90	0.52
133	23.598	0.177	0.41	75	2.82	101	82	-0.060	8.13	0.54
134	23.776	0.178	0.42	75	2.41	101	82	-0.050	8.13	0.52
135	23.953	0.177	0.42	75	1	101	82	-0.050	8.08	0.54
136	24.130	0.177	0.42	75	2.77	101	82	-0.050	7.93	0.55
137	24.308	0.178	0.41	75	3.03	101	82	-0.060	8.12	0.56
138	24.485	0.177	0.42	75	2.93	101	82	-0.060	8.11	0.53
139	24.663	0.178	0.41	75	2.97	101	81	-0.060	8.09	0.51
140	24.840	0.177	0.41	75	2.44	100	81	-0.060	7.84	0.47
141	25.018	0.178	0.41	75	0.72	101	81	-0.060	7.91	0.41
142	25.195	0.177	0.42	75	2.95	100	82	-0.050	7.71	0.36
143	25.372	0.177	0.41	75	2.89	100	82	-0.060	7.59	0.31
144	25.550	0.178	0.41	75	0.71	101	83	-0.050	7.44	0.36
145	25.727	0.177	0.42	75	1.93	100	83	-0.050	7.55	0.40
146	25.905	0.178	0.41	75	2.96	101	83	-0.050	7.22	0.36
147	26.082	0.177	0.41	75	2.53	100	84	-0.050	6.71	0.37
148	26.260	0.178	0.41	75	1	101	84	-0.050	6.26	0.46
149	26.437	0.177	0.41	75	1.63	100	84	-0.060	6.24	0.45
150	26.615	0.178	0.41	75	1.3	101	84	-0.050	6.36	0.46
151	26.792	0.177	0.41	75	0.72	100	84	-0.050	6.27	0.49
152	26.969	0.177	0.41	75	0.87	100	84	-0.060	6.28	0.49
153	27.147	0.178	0.41	75	1.54	101	84	-0.050	6.02	0.48
154	27.324	0.177	0.41	75	1.67	100	83	-0.050	5.76	0.43
155	27.502	0.178	0.41	75	2.99	101	83	-0.050	5.67	0.42
156	27.679	0.177	0.41	75	1.58	100	82	-0.050	5.50	0.47
157	27.857	0.178	0.41	75	1.68	101	82	-0.050	5.47	0.46
158	28.034	0.177	0.41	75	2.92	100	82	-0.050	5.35	0.48
159	28.211	0.177	0.41	75	1.38	100	82	-0.050	5.62	0.44

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 2

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/10/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
160	28.389	0.178	0.42	75	1.75	100	82	-0.050	5.63	0.43
161	28.566	0.177	0.41	75	1.71	100	82	-0.050	5.54	0.42
162	28.744	0.178	0.41	75	2.98	100	83	-0.050	5.50	0.44
163	28.921	0.177	0.40	75	2.96	100	83	-0.040	5.38	0.47
164	29.099	0.178	0.41	75	2.77	100	83	-0.050	5.10	0.52
165	29.276	0.177	0.41	75	2.61	100	83	-0.050	4.75	0.58
166	29.453	0.177	0.42	75	1.61	100	83	-0.040	4.62	0.57
167	29.631	0.178	0.41	75	2.7	100	83	-0.040	4.51	0.61
168	29.808	0.177	0.42	75	1.98	100	83	-0.040	4.42	0.61
169	29.986	0.178	0.41	75	2.84	100	83	-0.040	4.44	0.61
170	30.163	0.177	0.42	75	2.77	100	84	-0.040	4.39	0.60
171	30.341	0.178	0.41	75	2.93	100	84	-0.040	4.43	0.61
172	30.518	0.177	0.41	75	0.73	100	84	-0.040	4.45	0.61
173	30.695	0.177	0.41	75	2.91	100	84	-0.040	4.42	0.62
174	30.873	0.178	0.42	75	2.92	100	84	-0.040	4.50	0.61
175	31.050	0.177	0.42	75	2.76	100	84	-0.040	4.48	0.61
176	31.228	0.178	0.41	75	0.93	100	84	-0.040	4.45	0.61
177	31.405	0.177	0.41	75	2.99	100	84	-0.040	4.47	0.60
178	31.583	0.178	0.41	75	2.81	100	84	-0.040	4.53	0.60
179	31.760	0.177	0.41	75	2.95	100	84	-0.040	4.53	0.60
180	31.937	0.177	0.41	75	2.6	99	84	-0.040	4.59	0.62
181	32.115	0.178	0.41	75	2.93	100	84	-0.040	4.50	0.63
182	32.292	0.177	0.42	75	2.39	99	84	-0.040	4.55	0.63
183	32.470	0.178	0.42	75	1.7	100	84	-0.040	4.48	0.63
184	32.647	0.177	0.41	75	2.93	99	84	-0.040	4.47	0.60
185	32.825	0.178	0.42	75	3.05	100	84	-0.040	4.50	0.61
186	33.002	0.177	0.40	75	2.93	99	84	-0.040	4.50	0.64
187	33.179	0.177	0.41	75	1.32	99	84	-0.040	4.43	0.62
188	33.357	0.178	0.42	75	2.5	100	84	-0.040	4.51	0.61
189	33.534	0.177	0.42	75	2.91	99	84	-0.040	4.47	0.62
190	33.712	0.178	0.41	75	2.8	100	84	-0.040	4.52	0.59
191	33.889	0.177	0.41	75	2.39	99	84	-0.040	4.51	0.60

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 2

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/10/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
192	34.067	0.178	0.41	75	2.95	100	84	-0.050	4.53	0.62
193	34.244	0.177	0.41	75	2.28	99	83	-0.040	4.51	0.64
194	34.421	0.177	0.41	75	2.56	99	83	-0.030	4.45	0.63
195	34.599	0.178	0.42	75	2.53	100	83	-0.030	4.49	0.64
196	34.776	0.177	0.41	75	2.84	99	82	-0.040	4.43	0.66
197	34.954	0.178	0.41	75	1.64	100	82	-0.030	4.53	0.61
198	35.131	0.177	0.41	75	2.11	99	82	-0.040	4.59	0.59
199	35.309	0.178	0.41	75	2.55	100	81	-0.040	4.56	0.64
200	35.486	0.177	0.42	75	1.36	99	81	-0.040	4.63	0.65
201	35.663	0.177	0.41	75	2.94	99	81	-0.040	4.58	0.62
202	35.841	0.178	0.41	75	2.96	100	81	-0.040	4.62	0.62
203	36.018	0.177	0.42	75	2.41	99	81	-0.040	4.65	0.58
204	36.196	0.178	0.41	75	2.28	100	81	-0.040	4.50	0.60
205	36.373	0.177	0.42	75	2.54	99	82	-0.040	4.65	0.60
206	36.551	0.178	0.41	75	1.59	100	82	-0.040	4.70	0.59
207	36.728	0.177	0.41	75	1.64	99	82	-0.030	4.49	0.58
208	36.905	0.177	0.42	75	2.19	99	82	-0.040	4.61	0.58
209	37.083	0.178	0.41	75	2.33	100	82	-0.030	4.63	0.57
210	37.260	0.177	0.41	75	1.9	99	83	-0.030	4.59	0.56
211	37.438	0.178	0.42	75	1.96	100	83	-0.030	4.57	0.58
212	37.615	0.177	0.41	75	1.03	99	83	-0.040	4.59	0.56
213	37.793	0.178	0.41	75	1.21	100	83	-0.040	4.56	0.57
214	37.970	0.177	0.41	75	3.01	99	84	-0.030	4.58	0.56
215	38.147	0.177	0.42	75	1.64	99	84	-0.040	4.63	0.56
216	38.325	0.178	0.42	75	2.78	100	84	-0.040	4.53	0.55
217	38.502	0.177	0.42	75	2.69	99	84	-0.040	4.54	0.58
218	38.680	0.178	0.41	75	1.07	100	84	-0.030	4.50	0.56
219	38.857	0.177	0.42	75	0.8	99	84	-0.030	4.52	0.56
220	39.035	0.178	0.41	75	1.41	100	84	-0.040	4.53	0.56
221	39.212	0.177	0.41	75	1.44	99	84	-0.040	4.54	0.57
222	39.389	0.177	0.41	75	1.31	99	84	-0.030	4.52	0.55
223	39.567	0.178	0.41	75	1.2	100	84	-0.040	4.44	0.58

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 2

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/10/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
224	39.744	0.177	0.40	75	2.23	99	84	-0.040	4.56	0.60
225	39.922	0.178	0.41	75	1.73	100	84	-0.040	4.52	0.59
226	40.099	0.177	0.42	75	1	99	84	-0.030	4.52	0.59
227	40.277	0.178	0.41	75	3.01	100	84	-0.040	4.60	0.60
228	40.454	0.177	0.41	75	1.66	99	84	-0.040	4.56	0.58
229	40.631	0.177	0.41	75	0.71	99	85	-0.040	4.54	0.61
230	40.809	0.178	0.41	75	1.29	100	84	-0.030	4.55	0.61
231	40.986	0.177	0.41	75	0.88	99	84	-0.040	4.60	0.59
232	41.164	0.178	0.41	75	1.64	100	85	-0.030	4.64	0.60
233	41.341	0.177	0.41	75	2.44	99	85	-0.030	4.69	0.60
234	41.519	0.178	0.41	75	2.82	100	85	-0.040	4.54	0.61
235	41.696	0.177	0.41	75	1.54	99	85	-0.030	4.61	0.60
236	41.873	0.177	0.41	75	2.88	99	85	-0.030	4.68	0.62
237	42.051	0.178	0.41	75	1.58	100	85	-0.040	4.70	0.62
238	42.228	0.177	0.42	75	2.97	99	85	-0.030	4.70	0.60
239	42.406	0.178	0.41	75	2.96	100	85	-0.040	4.71	0.60
240	42.583	0.177	0.42	75	3	99	85	-0.040	4.55	0.66
241	42.761	0.178	0.41	75	1.7	100	85	-0.030	4.57	0.62
242	42.938	0.177	0.42	75	1.75	99	85	-0.040	4.69	0.61
243	43.115	0.177	0.42	75	2.87	99	85	-0.030	4.60	0.60
244	43.293	0.178	0.41	75	1.65	100	85	-0.030	4.61	0.60
245	43.470	0.177	0.42	75	2.78	99	85	-0.030	4.65	0.62
246	43.648	0.178	0.42	75	0.8	100	85	-0.030	4.82	0.59
247	43.825	0.177	0.42	75	0.78	99	85	-0.030	4.81	0.60
248	44.003	0.178	0.41	75	2.39	100	85	-0.030	4.80	0.60
249	44.180	0.177	0.42	75	1.35	99	85	-0.040	4.92	0.58
250	44.358	0.178	0.41	75	3.04	100	85	-0.030	4.36	0.60
251	44.535	0.177	0.41	74	2.7	99	85	-0.030	4.33	0.71
252	44.712	0.177	0.42	74	0.82	99	85	-0.030	4.30	0.68
253	44.890	0.178	0.42	74	1.47	100	85	-0.030	4.36	0.70
254	45.067	0.177	0.42	74	1.52	99	85	-0.030	4.32	0.69
255	45.245	0.178	0.41	74	0.96	100	85	-0.040	4.42	0.66

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 2

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/10/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
256	45.422	0.177	0.41	74	1.67	99	85	-0.030	4.27	0.64
257	45.600	0.178	0.42	74	0.97	100	85	-0.040	4.29	0.64
258	45.777	0.177	0.42	74	2.19	99	85	-0.030	4.41	0.64
259	45.954	0.177	0.42	74	2.95	99	85	-0.040	4.41	0.66
260	46.132	0.178	0.41	74	2.73	100	85	-0.040	4.26	0.65
261	46.309	0.177	0.41	74	2.76	99	85	-0.030	4.18	0.65
262	46.487	0.178	0.42	74	1.58	100	85	-0.030	4.31	0.65
263	46.664	0.177	0.41	74	1.23	99	85	-0.030	4.33	0.63
264	46.842	0.178	0.41	74	1.73	100	85	-0.040	4.27	0.66
265	47.019	0.177	0.41	74	1.66	99	85	-0.030	4.32	0.63
266	47.196	0.177	0.41	74	1.58	99	85	-0.040	4.25	0.65
267	47.374	0.178	0.41	74	2.09	100	85	-0.030	4.33	0.63
268	47.551	0.177	0.41	74	2.19	99	85	-0.030	4.25	0.63
269	47.729	0.178	0.42	74	2.92	100	85	-0.030	4.24	0.61
270	47.906	0.177	0.40	74	2.94	99	85	-0.040	4.25	0.63
271	48.084	0.178	0.41	74	3	100	85	-0.030	4.33	0.59
272	48.261	0.177	0.41	74	0.78	99	85	-0.040	4.46	0.62
273	48.438	0.177	0.41	74	2.16	99	85	-0.040	4.42	0.63
274	48.616	0.178	0.42	74	0.69	100	85	-0.040	4.31	0.63
275	48.793	0.177	0.41	74	2.88	99	85	-0.030	4.39	0.62
276	48.971	0.178	0.42	74	1.71	100	85	-0.030	4.34	0.64
277	49.148	0.177	0.42	74	2.63	99	85	-0.030	4.37	0.62
278	49.326	0.178	0.41	74	2.74	100	85	-0.030	4.26	0.66
279	49.503	0.177	0.42	74	2.93	99	85	-0.030	4.24	0.65
280	49.680	0.177	0.42	74	1.09	99	85	-0.030	4.32	0.63
281	49.858	0.178	0.42	74	2.91	100	85	-0.040	4.36	0.66
282	50.035	0.177	0.42	74	2.25	99	85	-0.030	4.40	0.68
283	50.213	0.178	0.41	74	1.54	100	85	-0.040	4.36	0.68
284	50.390	0.177	0.42	74	2.84	99	85	-0.030	4.36	0.69
285	50.568	0.178	0.42	74	1.26	100	85	-0.040	4.28	0.68
286	50.745	0.177	0.42	74	1.02	99	85	-0.040	4.29	0.67
287	50.922	0.177	0.42	74	1.43	99	85	-0.040	4.33	0.67

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 2

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/10/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
288	51.100	0.178	0.41	74	2.48	100	85	-0.030	4.37	0.65
289	51.277	0.177	0.41	74	1.64	99	85	-0.030	4.32	0.68
290	51.455	0.178	0.41	74	1.53	100	85	-0.030	4.29	0.66
291	51.632	0.177	0.41	74	2.91	99	85	-0.030	4.17	0.62
292	51.810	0.178	0.41	74	1.63	100	85	-0.040	4.13	0.63
293	51.987	0.177	0.42	74	0.7	99	85	-0.030	4.13	0.62
294	52.164	0.177	0.42	74	1.5	99	85	-0.040	4.14	0.63
295	52.342	0.178	0.41	74	1.57	100	85	-0.040	4.04	0.62
296	52.519	0.177	0.41	74	0.88	99	85	-0.030	3.81	0.65
297	52.697	0.178	0.41	74	1.58	100	85	-0.030	3.72	0.62
298	52.874	0.177	0.41	74	1.06	99	85	-0.040	3.83	0.64
299	53.052	0.178	0.42	74	2.98	100	85	-0.030	3.71	0.63
300	53.229	0.177	0.43	74	2.92	99	85	-0.030	3.81	0.63
301	53.406	0.177	0.41	74	1.57	99	85	-0.040	3.79	0.61
302	53.584	0.178	0.41	74	2.04	100	85	-0.040	3.78	0.62
303	53.761	0.177	0.41	74	2.02	99	85	-0.030	3.80	0.61
304	53.939	0.178	0.40	74	1.82	100	85	-0.040	3.78	0.61
305	54.116	0.177	0.41	74	3.03	99	85	-0.030	3.70	0.63
306	54.294	0.178	0.42	74	1.01	100	85	-0.030	3.70	0.59
307	54.471	0.177	0.41	74	1.81	99	85	-0.030	3.75	0.61
308	54.648	0.177	0.42	74	2.41	99	85	-0.030	3.74	0.64
309	54.826	0.178	0.41	74	2.51	100	85	-0.040	3.73	0.60
310	55.003	0.177	0.42	74	1.49	99	85	-0.030	3.70	0.61
311	55.181	0.178	0.42	74	2.81	100	85	-0.030	3.71	0.63
312	55.358	0.177	0.41	74	1.85	99	85	-0.040	3.78	0.63
313	55.536	0.178	0.41	74	3.03	100	85	-0.030	3.60	0.61
314	55.713	0.177	0.41	74	1.62	99	85	-0.030	3.60	0.61
315	55.890	0.177	0.41	74	2.93	99	85	-0.040	3.68	0.60
316	56.068	0.178	0.42	74	1.63	100	85	-0.030	3.74	0.60
317	56.245	0.177	0.41	74	1.76	99	85	-0.030	3.72	0.62
318	56.423	0.178	0.41	74	2.04	100	85	-0.040	3.78	0.60
319	56.600	0.177	0.42	74	2.27	99	85	-0.030	3.77	0.63

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 2

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/10/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
320	56.778	0.178	0.41	74	1.64	100	85	-0.030	3.88	0.62
321	56.955	0.177	0.41	74	2.96	99	85	-0.030	3.77	0.62
322	57.132	0.177	0.41	74	1.92	99	85	-0.040	3.86	0.62
323	57.310	0.178	0.42	74	1.45	100	85	-0.040	3.90	0.63
324	57.487	0.177	0.41	74	0.79	99	85	-0.030	3.82	0.64
325	57.665	0.178	0.42	74	2.28	100	85	-0.030	3.86	0.59
326	57.842	0.177	0.42	74	0.72	99	85	-0.030	3.88	0.60
327	58.020	0.178	0.41	74	2.78	100	85	-0.030	3.91	0.60
328	58.197	0.177	0.41	74	0.69	99	85	-0.030	4.01	0.59
329	58.374	0.177	0.42	74	2.65	99	85	-0.040	3.91	0.60
330	58.552	0.178	0.41	74	1.48	100	85	-0.030	3.89	0.62
331	58.729	0.177	0.42	74	1.54	99	85	-0.030	3.89	0.63
332	58.907	0.178	0.42	74	2.77	100	85	-0.030	3.86	0.60
333	59.084	0.177	0.42	74	2.52	99	85	-0.030	3.80	0.60
334	59.262	0.178	0.42	74	0.69	100	85	-0.040	4.00	0.61
335	59.439	0.177	0.42	74	2.81	99	85	-0.030	3.81	0.57
336	59.616	0.177	0.42	74	0.64	99	85	-0.030	3.85	0.59
337	59.794	0.178	0.41	74	2.74	100	85	-0.030	3.98	0.57
338	59.971	0.177	0.42	74	1.03	99	85	-0.030	3.90	0.59
339	60.149	0.178	0.42	74	1.73	100	85	-0.030	3.96	0.59
340	60.326	0.177	0.41	74	1.31	99	85	-0.040	3.98	0.60
341	60.504	0.178	0.42	74	2.55	100	85	-0.030	3.96	0.60
342	60.681	0.177	0.41	74	1.79	99	85	-0.030	3.89	0.62
343	60.859	0.178	0.42	74	2.93	100	85	-0.030	3.97	0.64
344	61.036	0.177	0.42	74	2.57	99	85	-0.040	3.99	0.62
345	61.213	0.177	0.41	74	1.71	99	85	-0.030	3.91	0.60
346	61.391	0.178	0.41	74	1.31	100	85	-0.030	3.84	0.62
347	61.568	0.177	0.41	74	1.63	99	85	-0.040	3.95	0.62
348	61.746	0.178	0.42	74	1.55	100	85	-0.030	3.92	0.59
349	61.923	0.177	0.41	74	1.77	99	85	-0.030	3.92	0.59
350	62.101	0.178	0.42	74	1.69	100	85	-0.030	3.97	0.57
351	62.278	0.177	0.42	74	0.76	99	85	-0.040	3.88	0.58

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 2

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/10/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
352	62.455	0.177	0.42	74	2.41	99	85	-0.030	4.00	0.58
353	62.633	0.178	0.42	74	2.86	100	85	-0.030	3.83	0.59
354	62.810	0.177	0.41	74	3.01	99	85	-0.040	3.93	0.59
355	62.988	0.178	0.41	74	2.95	100	85	-0.040	3.90	0.59
356	63.165	0.177	0.42	74	1.58	99	85	-0.030	3.88	0.60
357	63.343	0.178	0.42	74	1.89	100	85	-0.030	3.89	0.57
358	63.520	0.177	0.41	74	1.89	99	85	-0.030	3.88	0.58
359	63.697	0.177	0.42	74	1.47	99	85	-0.030	3.81	0.60
360	63.875	0.178	0.42	74	2.97	100	85	-0.030	3.87	0.62
361	64.052	0.177	0.41	73	1.07	99	85	-0.020	3.75	0.61
362	64.230	0.178	0.42	73	2.14	100	85	-0.030	3.74	0.60
363	64.407	0.177	0.41	73	2.07	99	85	-0.030	3.79	0.62
364	64.585	0.178	0.42	73	1.9	100	85	-0.030	3.83	0.60
365	64.762	0.177	0.41	73	2.62	99	85	-0.040	3.80	0.63
366	64.939	0.177	0.41	73	1.6	99	85	-0.030	3.85	0.60
367	65.117	0.178	0.42	73	2.58	100	85	-0.040	3.90	0.62
368	65.294	0.177	0.42	73	1.65	99	85	-0.030	3.83	0.62
369	65.472	0.178	0.42	73	3	100	85	-0.040	3.79	0.61
370	65.649	0.177	0.42	73	2.7	99	85	-0.030	3.56	0.60
371	65.827	0.178	0.41	73	1.62	100	85	-0.030	3.44	0.58
372	66.004	0.177	0.41	73	2.13	99	85	-0.030	3.49	0.58
373	66.181	0.177	0.41	73	2.78	99	85	-0.030	3.51	0.56
374	66.359	0.178	0.41	73	1.65	100	85	-0.030	3.45	0.57
375	66.536	0.177	0.42	73	2.77	99	85	-0.030	3.54	0.58
376	66.714	0.178	0.42	73	1.56	100	85	-0.030	3.45	0.56
377	66.891	0.177	0.41	73	2.76	99	85	-0.030	3.42	0.59
378	67.069	0.178	0.41	73	1.63	100	85	-0.030	3.32	0.58
379	67.246	0.177	0.42	73	2.84	99	85	-0.030	3.44	0.57
380	67.423	0.177	0.41	73	0.63	99	85	-0.030	3.32	0.56
381	67.601	0.178	0.41	73	1.62	100	85	-0.030	3.33	0.56
382	67.778	0.177	0.42	73	2.92	99	85	-0.030	3.39	0.58
383	67.956	0.178	0.42	73	2.85	100	85	-0.030	3.36	0.56

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Job #: 19-468
Model: ST210GL
Tracking #: 0026
Run #: 2
Technician: SJB
Date: 4/10/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
384	68.133	0.177	0.42	73	2.55	99	85	-0.030	3.34	0.60
385	68.311	0.178	0.41	73	1.02	100	85	-0.030	3.34	0.53
386	68.488	0.177	0.41	73	2.91	99	85	-0.030	3.35	0.56
387	68.665	0.177	0.41	73	1.61	99	85	-0.030	3.41	0.55
388	68.843	0.178	0.41	73	1.5	100	85	-0.030	3.30	0.58
389	69.020	0.177	0.41	73	1.03	99	85	-0.030	3.33	0.58
390	69.198	0.178	0.41	73	1.66	100	85	-0.030	3.30	0.58
391	69.375	0.177	0.41	73	1.63	99	85	-0.040	3.37	0.58
392	69.553	0.178	0.41	73	1.62	100	85	-0.030	3.37	0.61
393	69.730	0.177	0.41	73	1.67	99	85	-0.030	3.33	0.59
394	69.907	0.177	0.42	73	2.98	99	85	-0.020	3.33	0.58
395	70.085	0.178	0.41	73	1.56	100	85	-0.030	3.37	0.60
396	70.262	0.177	0.41	73	2.51	99	85	-0.030	3.32	0.60
397	70.440	0.178	0.41	73	2.96	100	85	-0.020	3.37	0.61
398	70.617	0.177	0.42	73	2.56	99	85	-0.030	3.29	0.61
399	70.795	0.178	0.41	73	1.62	100	85	-0.020	3.18	0.58
400	70.972	0.177	0.42	73	1.95	99	85	-0.040	3.32	0.60
401	71.149	0.177	0.42	73	0.98	99	85	-0.040	3.34	0.61
402	71.327	0.178	0.41	73	1.68	100	85	-0.030	3.38	0.58
403	71.504	0.177	0.41	73	1.76	99	85	-0.030	3.28	0.60
404	71.682	0.178	0.41	73	1.42	100	85	-0.030	3.29	0.60
405	71.859	0.177	0.41	73	2.97	99	85	-0.030	3.33	0.60
406	72.037	0.178	0.42	73	2.22	100	85	-0.030	3.42	0.60
407	72.214	0.177	0.41	73	0.92	99	85	-0.030	3.33	0.61
408	72.391	0.177	0.41	73	1.62	99	85	-0.030	3.35	0.59
409	72.569	0.178	0.42	73	2.65	100	85	-0.030	3.33	0.61
410	72.746	0.177	0.41	73	1.61	99	85	-0.030	3.26	0.61
411	72.924	0.178	0.42	73	1.52	100	85	-0.030	3.31	0.63
412	73.101	0.177	0.42	73	1.57	99	85	-0.040	3.35	0.61
413	73.279	0.178	0.42	73	0.93	100	85	-0.030	3.26	0.59
414	73.456	0.177	0.41	73	1.63	99	85	-0.030	3.27	0.61
415	73.633	0.177	0.42	73	2.89	99	85	-0.030	3.23	0.63

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Job #: 19-468
Model: ST210GL
Tracking #: 0026
Run #: 2
Technician: SJB
Date: 4/10/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
416	73.811	0.178	0.41	73	2.02	100	85	-0.020	3.30	0.60
417	73.988	0.177	0.41	73	2.92	99	85	-0.030	3.22	0.61
418	74.166	0.178	0.42	73	1.57	100	85	-0.030	3.18	0.61
419	74.343	0.177	0.42	73	2.88	99	85	-0.030	3.32	0.64
420	74.521	0.178	0.41	73	2.94	100	85	-0.030	3.20	0.64
421	74.698	0.177	0.41	73	1.71	99	85	-0.030	3.20	0.61
422	74.875	0.177	0.41	73	2.71	99	85	-0.030	3.28	0.63
423	75.053	0.178	0.41	73	1.58	100	85	-0.030	3.26	0.64
424	75.230	0.177	0.42	73	2.75	99	85	-0.030	3.27	0.61
425	75.408	0.178	0.41	73	2.08	100	85	-0.030	3.25	0.61
426	75.585	0.177	0.41	73	1.66	99	85	-0.030	3.25	0.61
427	75.763	0.178	0.42	73	2.61	100	85	-0.030	3.30	0.61
428	75.940	0.177	0.41	73	2.93	99	85	-0.020	3.23	0.60
429	76.117	0.177	0.42	73	0.87	99	85	-0.030	3.23	0.60
430	76.295	0.178	0.42	73	2.93	100	85	-0.020	3.20	0.62
431	76.472	0.177	0.42	73	1.17	99	85	-0.030	3.24	0.64
432	76.650	0.178	0.42	73	0.78	100	85	-0.030	3.10	0.63
433	76.827	0.177	0.42	73	2.9	99	84	-0.030	3.13	0.62
434	77.005	0.178	0.42	73	1.52	100	84	-0.030	3.10	0.60
435	77.182	0.177	0.42	73	0.88	99	85	-0.020	3.22	0.60
436	77.359	0.177	0.41	73	2.12	99	85	-0.020	3.12	0.61
437	77.537	0.178	0.42	73	2.79	100	84	-0.030	3.28	0.60
438	77.714	0.177	0.42	73	2.94	99	85	-0.030	3.13	0.58
439	77.892	0.178	0.41	73	1.96	100	85	-0.030	3.14	0.61
440	78.069	0.177	0.42	73	2.8	99	85	-0.030	3.17	0.59
441	78.247	0.178	0.41	73	2.25	100	85	-0.040	3.23	0.62
442	78.424	0.177	0.41	73	1.68	99	85	-0.030	3.28	0.60
443	78.602	0.178	0.41	73	0.68	100	84	-0.020	3.20	0.62
444	78.779	0.177	0.42	73	2.16	99	84	-0.020	3.12	0.62
445	78.956	0.177	0.41	73	2.4	99	84	-0.020	3.20	0.62
446	79.134	0.178	0.41	73	1.65	100	84	-0.030	3.19	0.59
447	79.311	0.177	0.42	73	2.91	99	84	-0.040	3.30	0.61

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 2

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/10/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
448	79.489	0.178	0.42	73	0.85	100	84	-0.030	3.28	0.61
449	79.666	0.177	0.41	73	1.95	99	84	-0.030	3.19	0.60
450	79.844	0.178	0.42	73	1.94	100	84	-0.030	3.28	0.61
451	80.021	0.177	0.41	73	1.7	99	84	-0.040	3.23	0.62
452	80.198	0.177	0.42	73	2.85	99	84	-0.030	3.24	0.60
453	80.376	0.178	0.42	73	0.66	100	84	-0.020	3.18	0.60
454	80.553	0.177	0.42	73	1.43	99	84	-0.030	3.19	0.64
455	80.731	0.178	0.41	73	0.72	100	84	-0.030	3.06	0.62
456	80.908	0.177	0.41	73	2.86	99	84	-0.030	3.18	0.60
457	81.086	0.178	0.42	73	2.16	100	84	-0.030	3.14	0.60
458	81.263	0.177	0.41	73	1.8	99	84	-0.030	3.22	0.63
459	81.440	0.177	0.42	73	0.7	99	84	-0.030	3.17	0.59
460	81.618	0.178	0.41	73	2.01	100	84	-0.020	3.14	0.61
461	81.795	0.177	0.42	73	2.94	99	84	-0.030	3.16	0.60
462	81.973	0.178	0.42	73	2.86	100	84	-0.030	3.24	0.61
463	82.150	0.177	0.41	73	1.51	99	84	-0.020	3.10	0.60
464	82.328	0.178	0.41	73	1.8	100	85	-0.030	3.20	0.62
465	82.505	0.177	0.41	73	1.59	99	85	-0.030	3.19	0.64
466	82.682	0.177	0.41	73	0.67	99	84	-0.030	3.14	0.61
467	82.860	0.178	0.42	73	2.51	100	84	-0.030	3.25	0.62
468	83.037	0.177	0.41	73	1.41	99	84	-0.030	3.14	0.60
469	83.215	0.178	0.42	73	2.44	100	85	-0.030	3.20	0.63
470	83.392	0.177	0.41	73	2.62	99	85	-0.030	3.12	0.63
471	83.570	0.178	0.41	73	2.94	100	84	-0.030	3.22	0.63
472	83.747	0.177	0.41	73	0.77	99	84	-0.030	3.16	0.67
473	83.924	0.177	0.42	73	1.77	99	85	-0.030	3.07	0.66
474	84.102	0.178	0.42	73	0.88	100	84	-0.030	3.10	0.66
475	84.279	0.177	0.42	73	2.83	99	85	-0.030	3.12	0.64
476	84.457	0.178	0.42	73	1.97	100	84	-0.030	3.14	0.64
477	84.634	0.177	0.40	73	2.88	99	84	-0.030	3.07	0.66
478	84.812	0.178	0.42	73	2.75	100	84	-0.030	3.03	0.67
479	84.989	0.177	0.42	73	1.61	99	84	-0.030	3.04	0.67

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 2

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/10/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
480	85.166	0.177	0.41	73	1.64	99	84	-0.030	3.01	0.66
481	85.344	0.178	0.42	73	2.72	100	84	-0.030	3.01	0.62
482	85.521	0.177	0.41	73	1.67	99	84	-0.030	2.99	0.64
483	85.699	0.178	0.41	73	1.59	100	84	-0.030	2.96	0.61
484	85.876	0.177	0.42	73	1.26	99	84	-0.030	3.06	0.61
485	86.054	0.178	0.42	73	0.69	100	84	-0.030	3.04	0.63
486	86.231	0.177	0.41	73	0.94	99	84	-0.030	3.08	0.63
487	86.408	0.177	0.42	73	2.81	99	84	-0.030	2.99	0.62
488	86.586	0.178	0.42	73	2.64	100	84	-0.030	3.01	0.62
489	86.763	0.177	0.41	73	0.79	99	84	-0.030	3.00	0.63
490	86.941	0.178	0.42	73	1.31	100	84	-0.020	2.95	0.65
491	87.118	0.177	0.42	73	2.08	99	84	-0.030	2.94	0.62
492	87.296	0.178	0.42	73	0.67	99	84	-0.030	3.04	0.62
493	87.473	0.177	0.42	73	2.65	99	84	-0.030	3.03	0.60
494	87.650	0.177	0.42	73	1.45	99	84	-0.030	3.06	0.62
495	87.828	0.178	0.41	73	2.06	100	84	-0.020	2.94	0.62
496	88.005	0.177	0.42	73	2.46	99	84	-0.030	3.07	0.63
497	88.183	0.178	0.41	73	1.45	99	84	-0.030	3.04	0.62
498	88.360	0.177	0.42	73	1.66	99	84	-0.030	2.98	0.60
499	88.538	0.178	0.42	73	1.19	99	84	-0.030	2.89	0.63
500	88.715	0.177	0.41	72	0.98	99	84	-0.030	2.95	0.63
501	88.892	0.177	0.41	72	1.17	99	84	-0.020	2.97	0.61
502	89.070	0.178	0.42	72	1.11	100	84	-0.030	3.00	0.62
503	89.247	0.177	0.42	72	1.67	99	84	-0.030	2.94	0.64
504	89.425	0.178	0.41	72	1.67	100	84	-0.030	3.06	0.64
505	89.602	0.177	0.42	72	2.02	99	84	-0.030	3.10	0.65
506	89.780	0.178	0.42	72	2.89	100	84	-0.030	3.03	0.63
507	89.957	0.177	0.41	72	1.74	99	84	-0.030	3.02	0.68
508	90.134	0.177	0.42	72	2.12	99	84	-0.020	3.00	0.64
509	90.312	0.178	0.41	72	1.57	100	84	-0.030	2.89	0.66
510	90.489	0.177	0.42	72	1.38	99	84	-0.030	2.99	0.65
511	90.667	0.178	0.42	72	2.87	100	84	-0.040	3.01	0.65

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 2

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/10/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
512	90.844	0.177	0.42	72	2.79	99	84	-0.030	3.03	0.65
513	91.022	0.178	0.41	72	2.62	100	84	-0.030	2.99	0.68
514	91.199	0.177	0.41	72	0.93	99	84	-0.030	2.98	0.66
515	91.376	0.177	0.42	72	2.39	99	84	-0.040	2.99	0.64
516	91.554	0.178	0.41	72	1.71	100	84	-0.030	2.86	0.67
517	91.731	0.177	0.42	72	2.8	99	84	-0.030	3.02	0.63
518	91.909	0.178	0.41	72	2.41	100	84	-0.030	2.91	0.61
519	92.086	0.177	0.41	72	1.6	99	84	-0.030	2.94	0.64
520	92.264	0.178	0.41	72	1.56	100	84	-0.030	3.05	0.66
521	92.441	0.177	0.41	72	1.43	99	84	-0.030	2.91	0.64
522	92.618	0.177	0.41	72	1.66	99	84	-0.030	2.94	0.62
523	92.796	0.178	0.41	72	1.11	100	84	-0.030	3.04	0.63
524	92.973	0.177	0.42	72	1.38	99	84	-0.030	2.83	0.64
525	93.151	0.178	0.40	72	1.63	100	84	-0.030	2.89	0.66
526	93.328	0.177	0.42	72	1.96	99	84	-0.030	2.93	0.64
527	93.506	0.178	0.42	72	2.79	100	84	-0.030	2.99	0.66
528	93.683	0.177	0.41	72	2.11	99	84	-0.030	2.92	0.63
529	93.860	0.177	0.42	72	1.73	99	84	-0.030	2.88	0.65
530	94.038	0.178	0.41	72	2.96	100	84	-0.030	2.83	0.63
531	94.215	0.177	0.41	72	1.64	99	84	-0.030	2.84	0.63
532	94.393	0.178	0.42	72	2.21	100	84	-0.030	2.80	0.65
533	94.570	0.177	0.41	72	1.79	99	84	-0.030	2.83	0.63
534	94.748	0.178	0.41	72	1.66	100	84	-0.030	2.88	0.65
535	94.925	0.177	0.42	72	1.84	99	84	-0.030	2.94	0.63
536	95.102	0.177	0.41	72	2.96	99	84	-0.030	2.84	0.63
537	95.280	0.178	0.42	72	2.86	100	84	-0.030	2.83	0.63
538	95.457	0.177	0.41	72	2.22	99	84	-0.030	2.83	0.62
539	95.635	0.178	0.42	72	2.65	100	84	-0.030	2.89	0.61
540	95.812	0.177	0.41	72	1.19	99	84	-0.030	2.78	0.60
541	95.990	0.178	0.41	72	2.93	100	84	-0.030	2.87	0.63
542	96.167	0.177	0.42	72	1.51	99	84	-0.030	2.83	0.60
543	96.345	0.178	0.41	72	2.62	100	84	-0.030	2.75	0.63

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 2

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/10/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
544	96.522	0.177	0.41	72	1.68	99	84	-0.030	2.69	0.61
545	96.699	0.177	0.42	72	2.93	99	84	-0.020	2.65	0.60
546	96.877	0.178	0.42	72	2.86	100	84	-0.030	2.72	0.59
547	97.054	0.177	0.42	72	1.66	99	84	-0.020	2.79	0.61
548	97.232	0.178	0.42	72	1.35	100	84	-0.020	2.75	0.59
549	97.409	0.177	0.41	72	1.6	99	84	-0.030	2.66	0.62
550	97.587	0.178	0.42	72	1.77	100	84	-0.030	2.72	0.59
551	97.764	0.177	0.42	72	0.67	99	84	-0.030	2.65	0.60
552	97.941	0.177	0.42	72	2.93	99	84	-0.030	2.63	0.56
553	98.119	0.178	0.42	72	2.76	100	84	-0.030	2.63	0.59
554	98.296	0.177	0.42	72	1.9	99	84	-0.030	2.58	0.58
555	98.474	0.178	0.42	72	2.46	100	84	-0.030	2.54	0.57
556	98.651	0.177	0.42	72	2.49	99	84	-0.020	2.59	0.56
557	98.829	0.178	0.42	72	1.5	100	84	-0.020	2.47	0.57
558	99.006	0.177	0.42	72	2.93	99	84	-0.020	2.49	0.54
559	99.183	0.177	0.42	72	2.63	99	84	-0.030	2.42	0.55
560	99.361	0.178	0.41	72	1.61	100	84	-0.030	2.36	0.51
561	99.538	0.177	0.42	72	1.02	99	84	-0.030	2.28	0.50
562	99.716	0.178	0.41	72	2.74	100	84	-0.030	2.28	0.50
563	99.893	0.177	0.41	72	2.97	99	84	-0.030	2.23	0.51
564	100.071	0.178	0.42	72	1.61	100	84	-0.030	2.18	0.49
565	100.248	0.177	0.41	72	2.09	99	84	-0.030	2.29	0.50
566	100.425	0.177	0.41	72	2.94	99	84	-0.030	2.27	0.47
567	100.603	0.178	0.41	72	1.56	100	84	-0.020	2.23	0.49
568	100.780	0.177	0.41	72	1.66	99	84	-0.020	2.16	0.48
569	100.958	0.178	0.41	72	1.6	100	84	-0.030	2.15	0.50
570	101.135	0.177	0.42	72	2.42	99	84	-0.030	2.20	0.50
571	101.313	0.178	0.41	72	1.61	100	84	-0.030	2.19	0.49
572	101.490	0.177	0.42	72	1.65	99	84	-0.030	2.23	0.48
573	101.667	0.177	0.42	72	1.65	99	84	-0.030	2.24	0.49
574	101.845	0.178	0.42	72	2.52	100	84	-0.030	2.20	0.48
575	102.022	0.177	0.42	72	1.56	99	84	-0.030	2.18	0.49

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 2

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/10/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
576	102.200	0.178	0.42	72	2.86	100	84	-0.030	2.23	0.53
577	102.377	0.177	0.42	72	2.89	99	84	-0.020	2.33	0.52
578	102.555	0.178	0.41	72	1.22	100	84	-0.020	2.29	0.51
579	102.732	0.177	0.41	72	2.86	99	84	-0.030	2.30	0.49
580	102.909	0.177	0.41	72	2.64	99	84	-0.020	2.21	0.53
581	103.087	0.178	0.42	72	2.77	100	84	-0.020	2.26	0.48
582	103.264	0.177	0.42	72	2.96	99	84	-0.020	2.25	0.49
583	103.442	0.178	0.41	72	2.95	100	84	-0.030	2.20	0.52
584	103.619	0.177	0.41	72	1.08	99	84	-0.030	2.27	0.50
585	103.797	0.178	0.41	72	1.68	100	84	-0.030	2.18	0.49
586	103.974	0.177	0.42	72	2.83	99	84	-0.030	2.20	0.48
587	104.151	0.177	0.42	72	2.75	99	84	-0.020	2.16	0.47
588	104.329	0.178	0.42	72	1.56	100	84	-0.030	2.10	0.50
589	104.506	0.177	0.42	72	2.53	99	84	-0.020	2.17	0.50
590	104.684	0.178	0.41	72	2.93	100	84	-0.030	2.11	0.49
591	104.861	0.177	0.42	72	2.87	99	84	-0.020	2.01	0.48
592	105.039	0.178	0.41	72	3.02	100	84	-0.030	2.11	0.49
593	105.216	0.177	0.42	72	2.41	99	84	-0.020	2.12	0.49
594	105.393	0.177	0.42	72	1.63	99	84	-0.020	2.07	0.49
595	105.571	0.178	0.41	72	1.74	100	84	-0.020	2.05	0.47
596	105.748	0.177	0.41	72	0.7	99	84	-0.020	2.09	0.47
597	105.926	0.178	0.42	72	2.83	99	84	-0.020	2.06	0.48
598	106.103	0.177	0.42	72	2.28	99	84	-0.020	2.08	0.47
599	106.281	0.178	0.42	72	0.87	99	84	-0.020	2.08	0.46
600	106.458	0.177	0.41	72	1.41	99	84	-0.020	2.00	0.47
601	106.635	0.177	0.42	72	2.09	99	84	-0.020	2.03	0.48
602	106.813	0.178	0.42	72	2.57	99	84	-0.020	2.01	0.49
603	106.990	0.177	0.42	72	2.73	99	84	-0.020	1.98	0.50
604	107.168	0.178	0.41	72	1.61	99	84	-0.020	2.00	0.47
605	107.345	0.177	0.42	72	1.94	99	84	-0.020	2.01	0.49
606	107.523	0.178	0.42	72	2.85	99	84	-0.020	1.99	0.46
Avg/Tot	107.523	0.177	0.41	73	2.02	100			4.88	0.54

WOODSTOVE SURFACE TEMPERATURE DATA

Client: IHP
Model: ST210GL
Run #: 2

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/10/2019

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
0	517	472	407	518	540	490.8	N/A
1	517	471	402	488	540	483.6	N/A
2	516	468	407	473	539	480.6	N/A
3	514	468	400	464	540	477.2	N/A
4	511	463	400	467	540	476.2	N/A
5	507	459	397	497	539	479.8	N/A
6	503	454	395	525	538	483.0	N/A
7	498	448	393	550	536	485.0	N/A
8	493	445	391	579	535	488.6	N/A
9	488	440	386	612	534	492.0	N/A
10	483	436	383	645	530	495.4	N/A
11	478	431	376	680	529	498.8	N/A
12	473	427	375	714	527	503.2	N/A
13	469	425	371	739	525	505.8	N/A
14	465	422	366	753	522	505.6	N/A
15	460	421	370	768	520	507.8	N/A
16	457	420	365	770	517	505.8	N/A
17	454	419	359	781	514	505.4	N/A
18	450	417	356	786	511	504.0	N/A
19	447	416	355	785	509	502.4	N/A
20	444	414	351	781	507	499.4	N/A
21	442	411	344	781	505	496.6	N/A
22	440	407	349	784	502	496.4	N/A
23	438	406	345	784	500	494.6	N/A
24	437	402	347	784	496	493.2	N/A
25	435	401	340	786	494	491.2	N/A
26	433	398	337	786	492	489.2	N/A
27	432	394	337	786	490	487.8	N/A
28	431	394	338	786	487	487.2	N/A
29	429	390	329	786	485	483.8	N/A
30	428	389	332	784	483	483.2	N/A
31	427	386	322	783	480	479.6	N/A
32	427	385	327	782	478	479.8	N/A
33	426	385	326	782	475	478.8	N/A
34	425	382	322	783	472	476.8	N/A
35	425	383	322	783	470	476.6	N/A
36	425	383	320	784	467	475.8	N/A
37	425	381	312	785	465	473.6	N/A
38	425	382	319	788	462	475.2	N/A
39	424	382	314	794	460	474.8	N/A
40	424	383	315	795	457	474.8	N/A
41	424	382	315	799	454	474.8	N/A
42	424	382	308	806	452	474.4	N/A
43	424	383	310	812	450	475.8	N/A
44	423	384	310	815	447	475.8	N/A
45	423	384	310	813	445	475.0	N/A
46	422	385	311	811	443	474.4	N/A
47	422	386	309	807	440	472.8	N/A

WOODSTOVE SURFACE TEMPERATURE DATA

Client: IHP
Model: ST210GL
Run #: 2

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/10/2019

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
48	421	386	312	801	438	471.6	N/A
49	421	386	308	796	435	469.2	N/A
50	420	387	313	791	433	468.8	N/A
51	419	388	311	787	430	467.0	N/A
52	419	387	307	783	428	464.8	N/A
53	419	388	309	780	426	464.4	N/A
54	418	387	305	778	423	462.2	N/A
55	418	389	312	774	421	462.8	N/A
56	418	388	304	772	419	460.2	N/A
57	418	390	305	770	417	460.0	N/A
58	417	390	310	768	415	460.0	N/A
59	417	392	309	769	413	460.0	N/A
60	417	393	308	770	411	459.8	N/A
61	417	393	308	771	408	459.4	N/A
62	417	393	309	772	406	459.4	N/A
63	416	393	308	773	404	458.8	N/A
64	416	394	302	774	402	457.6	N/A
65	416	393	307	775	400	458.2	N/A
66	416	393	307	781	398	459.0	N/A
67	416	395	306	786	396	459.8	N/A
68	417	396	307	789	394	460.6	N/A
69	417	396	308	791	393	461.0	N/A
70	418	395	303	791	391	459.6	N/A
71	419	396	307	791	389	460.4	N/A
72	420	396	303	789	388	459.2	N/A
73	421	396	302	790	386	459.0	N/A
74	421	397	305	790	384	459.4	N/A
75	422	396	307	790	383	459.6	N/A
76	423	397	306	786	381	458.6	N/A
77	424	398	311	781	379	458.6	N/A
78	425	399	310	779	377	458.0	N/A
79	425	400	310	777	376	457.6	N/A
80	426	401	311	773	374	457.0	N/A
81	427	401	311	769	373	456.2	N/A
82	428	402	312	764	372	455.6	N/A
83	428	403	312	760	370	454.6	N/A
84	429	404	314	754	369	454.0	N/A
85	430	403	315	751	368	453.4	N/A
86	430	404	310	746	366	451.2	N/A
87	431	405	311	742	365	450.8	N/A
88	432	407	316	742	364	452.2	N/A
89	433	407	314	741	362	451.4	N/A
90	433	408	313	737	361	450.4	N/A
91	433	409	315	733	360	450.0	N/A
92	434	411	314	729	359	449.4	N/A
93	434	412	313	727	358	448.8	N/A
94	435	413	317	723	357	449.0	N/A
95	435	415	320	722	356	449.6	N/A

WOODSTOVE SURFACE TEMPERATURE DATA

Client: IHP
Model: ST210GL
Run #: 2

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/10/2019

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
96	434	416	315	719	354	447.6	N/A
97	434	418	321	718	353	448.8	N/A
98	434	420	322	718	352	449.2	N/A
99	434	422	323	719	351	449.8	N/A
100	434	423	318	717	350	448.4	N/A
101	434	424	321	716	349	448.8	N/A
102	434	425	319	718	348	448.8	N/A
103	434	427	321	719	347	449.6	N/A
104	434	428	318	719	346	449.0	N/A
105	434	430	324	715	345	449.6	N/A
106	433	431	323	709	345	448.2	N/A
107	433	432	320	700	344	445.8	N/A
108	433	433	323	692	343	444.8	N/A
109	432	435	327	685	342	444.2	N/A
110	432	436	327	679	341	443.0	N/A
111	432	437	323	674	340	441.2	N/A
112	432	438	328	669	340	441.4	N/A
113	432	439	330	666	339	441.2	N/A
114	431	440	329	662	338	440.0	N/A
115	431	442	328	659	338	439.6	N/A
116	431	442	328	656	337	438.8	N/A
117	431	443	324	654	336	437.6	N/A
118	430	445	330	651	336	438.4	N/A
119	430	444	331	646	335	437.2	N/A
120	430	446	330	637	335	435.6	N/A
121	429	446	335	631	334	435.0	N/A
122	429	447	335	625	333	433.8	N/A
123	429	447	331	621	333	432.2	N/A
124	429	447	331	617	332	431.2	N/A
125	429	446	329	615	332	430.2	N/A
126	430	448	328	612	332	430.0	N/A
127	430	449	331	610	331	430.2	N/A
128	430	449	331	608	331	429.8	N/A
129	430	449	336	607	330	430.4	N/A
130	430	450	338	606	330	430.8	N/A
131	430	450	331	604	330	429.0	N/A
132	430	449	332	603	329	428.6	N/A
133	431	449	336	601	329	429.2	N/A
134	431	451	330	601	329	428.4	N/A
135	432	452	334	600	329	429.4	N/A
136	432	451	330	599	329	428.2	N/A
137	433	451	334	600	329	429.4	N/A
138	433	451	329	599	329	428.2	N/A
139	434	452	340	600	329	431.0	N/A
140	434	452	335	599	329	429.8	N/A
141	434	451	335	597	329	429.2	N/A
142	435	451	335	594	330	429.0	N/A
143	436	450	336	591	330	428.6	N/A

WOODSTOVE SURFACE TEMPERATURE DATA

Client: IHP
Model: ST210GL
Run #: 2

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/10/2019

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
144	437	449	332	587	330	427.0	N/A
145	437	450	337	584	330	427.6	N/A
146	438	448	337	581	331	427.0	N/A
147	438	447	338	575	331	425.8	N/A
148	439	445	340	569	331	424.8	N/A
149	439	445	335	564	331	422.8	N/A
150	439	445	337	559	332	422.4	N/A
151	439	444	339	554	332	421.6	N/A
152	439	442	334	548	332	419.0	N/A
153	439	443	339	541	333	419.0	N/A
154	438	442	338	535	333	417.2	N/A
155	438	441	338	529	334	416.0	N/A
156	437	439	338	523	334	414.2	N/A
157	435	439	341	518	335	413.6	N/A
158	434	439	336	515	335	411.8	N/A
159	433	437	339	513	336	411.6	N/A
160	432	436	340	509	337	410.8	N/A
161	431	435	339	506	337	409.6	N/A
162	430	435	335	501	338	407.8	N/A
163	429	434	340	495	339	407.4	N/A
164	428	432	337	489	339	405.0	N/A
165	427	431	338	482	340	403.6	N/A
166	425	429	340	476	341	402.2	N/A
167	423	426	337	469	341	399.2	N/A
168	422	423	337	463	342	397.4	N/A
169	420	422	336	458	342	395.6	N/A
170	418	419	335	453	343	393.6	N/A
171	416	417	336	448	343	392.0	N/A
172	415	415	330	444	344	389.6	N/A
173	413	413	333	439	344	388.4	N/A
174	411	411	338	436	345	388.2	N/A
175	409	408	334	432	345	385.6	N/A
176	408	407	334	428	345	384.4	N/A
177	406	406	331	425	346	382.8	N/A
178	404	404	329	421	347	381.0	N/A
179	403	402	331	418	347	380.2	N/A
180	401	400	327	415	348	378.2	N/A
181	399	399	329	413	348	377.6	N/A
182	398	397	328	410	348	376.2	N/A
183	396	395	325	408	349	374.6	N/A
184	395	395	326	405	349	374.0	N/A
185	393	392	327	403	350	373.0	N/A
186	392	392	330	401	351	373.2	N/A
187	390	391	320	398	351	370.0	N/A
188	389	390	325	396	352	370.4	N/A
189	387	389	321	394	352	368.6	N/A
190	386	388	322	392	353	368.2	N/A
191	385	388	322	390	353	367.6	N/A

WOODSTOVE SURFACE TEMPERATURE DATA

Client: IHP
Model: ST210GL
Run #: 2

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/10/2019

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
192	383	386	321	388	354	366.4	N/A
193	382	385	317	386	355	365.0	N/A
194	381	384	321	385	355	365.2	N/A
195	380	383	319	383	356	364.2	N/A
196	378	383	321	382	356	364.0	N/A
197	377	382	320	381	357	363.4	N/A
198	376	382	320	381	358	363.4	N/A
199	375	380	319	381	358	362.6	N/A
200	374	380	322	380	359	363.0	N/A
201	373	378	316	380	359	361.2	N/A
202	372	379	317	379	360	361.4	N/A
203	371	378	316	378	360	360.6	N/A
204	370	377	313	377	361	359.6	N/A
205	369	378	318	377	361	360.6	N/A
206	368	376	312	376	362	358.8	N/A
207	367	377	310	374	362	358.0	N/A
208	366	374	312	374	363	357.8	N/A
209	365	374	309	373	363	356.8	N/A
210	364	375	313	372	364	357.6	N/A
211	363	374	315	371	364	357.4	N/A
212	363	374	310	371	365	356.6	N/A
213	362	374	312	370	365	356.6	N/A
214	361	373	314	369	365	356.4	N/A
215	360	373	311	368	366	355.6	N/A
216	360	372	311	367	366	355.2	N/A
217	359	372	311	366	367	355.0	N/A
218	358	371	311	365	367	354.4	N/A
219	358	371	310	364	368	354.2	N/A
220	357	371	309	363	368	353.6	N/A
221	356	369	308	362	368	352.6	N/A
222	356	369	307	361	369	352.4	N/A
223	355	369	306	360	369	351.8	N/A
224	355	369	308	359	370	352.2	N/A
225	354	369	306	359	370	351.6	N/A
226	354	367	306	358	370	351.0	N/A
227	353	367	306	358	371	351.0	N/A
228	353	367	304	357	371	350.4	N/A
229	352	367	306	356	372	350.6	N/A
230	352	367	305	356	372	350.4	N/A
231	351	365	305	355	373	349.8	N/A
232	351	365	299	355	373	348.6	N/A
233	350	365	303	354	374	349.2	N/A
234	350	364	304	354	374	349.2	N/A
235	350	363	303	353	375	348.8	N/A
236	349	364	304	353	375	349.0	N/A
237	349	363	304	352	375	348.6	N/A
238	348	363	303	352	376	348.4	N/A
239	348	363	305	352	376	348.8	N/A

WOODSTOVE SURFACE TEMPERATURE DATA

Client: IHP
Model: ST210GL
Run #: 2

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/10/2019

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
240	348	362	303	352	377	348.4	N/A
241	348	362	301	351	377	347.8	N/A
242	348	362	304	351	378	348.6	N/A
243	348	360	301	351	378	347.6	N/A
244	348	361	300	351	379	347.8	N/A
245	348	360	301	351	379	347.8	N/A
246	348	359	299	351	380	347.4	N/A
247	348	359	298	351	380	347.2	N/A
248	348	358	298	351	381	347.2	N/A
249	349	358	299	350	381	347.4	N/A
250	349	358	301	350	382	348.0	N/A
251	350	357	302	350	382	348.2	N/A
252	350	356	296	349	383	346.8	N/A
253	351	356	299	349	383	347.6	N/A
254	351	355	301	349	384	348.0	N/A
255	351	354	298	348	384	347.0	N/A
256	351	354	298	347	385	347.0	N/A
257	351	355	297	347	385	347.0	N/A
258	352	354	298	346	385	347.0	N/A
259	352	353	296	346	386	346.6	N/A
260	352	353	299	345	386	347.0	N/A
261	352	353	298	345	386	346.8	N/A
262	352	353	299	344	386	346.8	N/A
263	352	353	297	344	386	346.4	N/A
264	352	352	297	343	386	346.0	N/A
265	353	351	295	342	386	345.4	N/A
266	352	352	295	342	385	345.2	N/A
267	352	352	296	342	385	345.4	N/A
268	353	351	295	341	385	345.0	N/A
269	353	351	291	341	385	344.2	N/A
270	352	351	295	340	384	344.4	N/A
271	353	351	296	340	384	344.8	N/A
272	353	349	292	339	383	343.2	N/A
273	352	351	294	339	383	343.8	N/A
274	352	350	294	339	383	343.6	N/A
275	353	349	292	338	382	342.8	N/A
276	353	350	289	338	382	342.4	N/A
277	353	351	291	337	381	342.6	N/A
278	353	348	295	337	381	342.8	N/A
279	353	350	292	337	380	342.4	N/A
280	353	349	290	337	380	341.8	N/A
281	353	350	291	336	380	342.0	N/A
282	353	349	288	336	379	341.0	N/A
283	353	349	288	336	379	341.0	N/A
284	353	349	288	336	378	340.8	N/A
285	354	349	290	335	378	341.2	N/A
286	354	349	291	335	377	341.2	N/A
287	354	349	291	335	377	341.2	N/A

WOODSTOVE SURFACE TEMPERATURE DATA

Client: IHP
Model: ST210GL
Run #: 2

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/10/2019

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
288	354	349	288	335	377	340.6	N/A
289	354	349	287	334	376	340.0	N/A
290	354	349	292	334	376	341.0	N/A
291	354	350	289	334	375	340.4	N/A
292	354	350	291	334	375	340.8	N/A
293	354	349	290	334	375	340.4	N/A
294	354	349	289	333	374	339.8	N/A
295	354	349	288	333	374	339.6	N/A
296	354	349	290	332	374	339.8	N/A
297	354	346	289	331	373	338.6	N/A
298	354	347	288	330	373	338.4	N/A
299	353	346	287	329	373	337.6	N/A
300	353	345	285	328	372	336.6	N/A
301	353	344	288	328	372	337.0	N/A
302	353	345	286	327	372	336.6	N/A
303	352	344	291	326	371	336.8	N/A
304	352	343	284	325	371	335.0	N/A
305	352	342	284	324	371	334.6	N/A
306	351	343	288	323	370	335.0	N/A
307	351	343	287	322	370	334.6	N/A
308	351	342	287	321	370	334.2	N/A
309	350	342	286	320	369	333.4	N/A
310	350	342	285	319	369	333.0	N/A
311	349	341	288	318	369	333.0	N/A
312	349	340	286	318	368	332.2	N/A
313	349	340	285	317	368	331.8	N/A
314	348	340	285	316	368	331.4	N/A
315	347	340	289	316	367	331.8	N/A
316	347	340	287	315	367	331.2	N/A
317	346	339	288	314	367	330.8	N/A
318	346	339	283	313	366	329.4	N/A
319	345	339	282	313	366	329.0	N/A
320	345	339	285	312	366	329.4	N/A
321	344	338	282	311	365	328.0	N/A
322	344	339	280	311	365	327.8	N/A
323	343	338	282	310	365	327.6	N/A
324	343	339	284	309	365	328.0	N/A
325	342	338	282	309	365	327.2	N/A
326	342	338	282	309	364	327.0	N/A
327	341	339	285	309	364	327.6	N/A
328	341	339	281	309	364	326.8	N/A
329	340	339	278	308	364	325.8	N/A
330	340	339	279	308	363	325.8	N/A
331	340	340	280	308	363	326.2	N/A
332	339	340	277	308	363	325.4	N/A
333	339	340	279	308	363	325.8	N/A
334	338	340	279	307	363	325.4	N/A
335	338	340	277	307	363	325.0	N/A

WOODSTOVE SURFACE TEMPERATURE DATA

Client: IHP
Model: ST210GL
Run #: 2

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/10/2019

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
336	338	340	278	307	363	325.2	N/A
337	337	340	277	307	363	324.8	N/A
338	337	341	282	307	363	326.0	N/A
339	336	340	278	306	363	324.6	N/A
340	336	340	279	306	363	324.8	N/A
341	335	340	275	306	363	323.8	N/A
342	335	340	282	306	363	325.2	N/A
343	334	340	278	306	363	324.2	N/A
344	334	339	278	305	363	323.8	N/A
345	334	340	277	305	363	323.8	N/A
346	333	340	279	305	363	324.0	N/A
347	333	339	278	305	363	323.6	N/A
348	333	338	278	305	363	323.4	N/A
349	332	339	277	305	363	323.2	N/A
350	332	337	278	305	364	323.2	N/A
351	332	339	278	304	364	323.4	N/A
352	332	338	278	304	364	323.2	N/A
353	331	338	276	304	364	322.6	N/A
354	331	338	279	304	364	323.2	N/A
355	331	337	276	303	364	322.2	N/A
356	331	337	280	303	364	323.0	N/A
357	330	336	277	303	364	322.0	N/A
358	330	337	276	303	365	322.2	N/A
359	330	337	278	303	365	322.6	N/A
360	330	336	277	303	365	322.2	N/A
361	329	335	276	303	365	321.6	N/A
362	329	336	278	303	365	322.2	N/A
363	329	335	276	302	365	321.4	N/A
364	328	336	278	302	365	321.8	N/A
365	328	334	276	302	366	321.2	N/A
366	328	335	274	302	366	321.0	N/A
367	328	334	277	302	366	321.4	N/A
368	327	334	278	301	366	321.2	N/A
369	327	335	279	301	366	321.6	N/A
370	327	334	276	301	366	320.8	N/A
371	326	334	278	300	367	321.0	N/A
372	326	334	279	300	367	321.2	N/A
373	326	334	278	299	367	320.8	N/A
374	326	333	278	299	367	320.6	N/A
375	325	334	278	298	367	320.4	N/A
376	325	332	282	298	367	320.8	N/A
377	325	331	274	297	367	318.8	N/A
378	324	332	277	297	367	319.4	N/A
379	324	332	273	296	367	318.4	N/A
380	324	331	275	295	367	318.4	N/A
381	323	331	272	295	367	317.6	N/A
382	323	330	272	294	366	317.0	N/A
383	323	330	277	294	366	318.0	N/A

WOODSTOVE SURFACE TEMPERATURE DATA

Client: IHP
Model: ST210GL
Run #: 2

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/10/2019

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
384	322	329	276	293	366	317.2	N/A
385	322	329	276	292	366	317.0	N/A
386	321	328	276	292	365	316.4	N/A
387	321	328	274	291	365	315.8	N/A
388	321	327	277	291	365	316.2	N/A
389	320	327	275	290	364	315.2	N/A
390	320	326	274	290	364	314.8	N/A
391	320	326	274	289	364	314.6	N/A
392	319	324	275	289	363	314.0	N/A
393	319	325	275	288	363	314.0	N/A
394	318	323	273	288	362	312.8	N/A
395	318	324	272	287	362	312.6	N/A
396	318	323	273	287	361	312.4	N/A
397	317	322	276	286	361	312.4	N/A
398	317	322	271	286	361	311.4	N/A
399	317	321	269	285	360	310.4	N/A
400	317	321	271	285	360	310.8	N/A
401	316	321	272	284	359	310.4	N/A
402	316	321	271	284	359	310.2	N/A
403	316	320	267	283	359	309.0	N/A
404	316	319	268	283	358	308.8	N/A
405	316	319	270	283	358	309.2	N/A
406	315	319	269	282	357	308.4	N/A
407	315	317	269	282	357	308.0	N/A
408	315	318	267	282	357	307.8	N/A
409	315	317	270	281	356	307.8	N/A
410	315	317	267	281	356	307.2	N/A
411	315	315	267	280	355	306.4	N/A
412	314	315	268	280	355	306.4	N/A
413	314	316	269	280	355	306.8	N/A
414	314	315	267	279	354	305.8	N/A
415	313	315	266	279	354	305.4	N/A
416	313	314	265	279	353	304.8	N/A
417	313	313	269	278	353	305.2	N/A
418	313	313	267	278	353	304.8	N/A
419	312	313	266	278	352	304.2	N/A
420	312	313	268	277	352	304.4	N/A
421	312	312	266	277	352	303.8	N/A
422	311	312	266	276	351	303.2	N/A
423	311	311	269	276	351	303.6	N/A
424	311	311	266	276	350	302.8	N/A
425	311	310	267	275	350	302.6	N/A
426	311	311	265	275	350	302.4	N/A
427	310	310	265	275	349	301.8	N/A
428	310	309	264	274	349	301.2	N/A
429	310	309	269	274	349	302.2	N/A
430	309	308	269	274	348	301.6	N/A
431	309	308	265	274	348	300.8	N/A

WOODSTOVE SURFACE TEMPERATURE DATA

Client: IHP
Model: ST210GL
Run #: 2

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/10/2019

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
432	309	308	265	274	348	300.8	N/A
433	309	308	263	273	348	300.2	N/A
434	308	308	265	273	347	300.2	N/A
435	308	308	265	273	347	300.2	N/A
436	308	308	263	272	347	299.6	N/A
437	308	307	264	272	347	299.6	N/A
438	307	307	264	271	346	299.0	N/A
439	307	307	264	271	346	299.0	N/A
440	307	307	266	271	346	299.4	N/A
441	307	306	261	271	346	298.2	N/A
442	306	306	265	270	345	298.4	N/A
443	306	306	266	270	345	298.6	N/A
444	306	305	264	270	345	298.0	N/A
445	305	305	262	270	344	297.2	N/A
446	305	305	262	270	344	297.2	N/A
447	305	304	267	269	344	297.8	N/A
448	305	304	262	269	343	296.6	N/A
449	304	304	260	269	343	296.0	N/A
450	304	304	263	269	343	296.6	N/A
451	304	304	260	268	342	295.6	N/A
452	304	304	262	268	342	296.0	N/A
453	304	303	263	268	342	296.0	N/A
454	303	303	263	268	341	295.6	N/A
455	303	303	264	267	341	295.6	N/A
456	303	302	263	267	340	295.0	N/A
457	302	302	261	267	340	294.4	N/A
458	302	302	263	266	340	294.6	N/A
459	302	301	263	266	339	294.2	N/A
460	302	301	264	266	339	294.4	N/A
461	302	300	261	266	338	293.4	N/A
462	301	301	261	265	338	293.2	N/A
463	301	300	261	265	338	293.0	N/A
464	301	300	264	265	337	293.4	N/A
465	301	300	265	265	337	293.6	N/A
466	300	299	262	264	337	292.4	N/A
467	300	299	261	264	336	292.0	N/A
468	300	299	260	264	336	291.8	N/A
469	300	298	260	264	335	291.4	N/A
470	300	298	259	263	335	291.0	N/A
471	299	298	260	263	335	291.0	N/A
472	299	298	259	263	334	290.6	N/A
473	299	297	259	263	334	290.4	N/A
474	299	297	260	263	334	290.6	N/A
475	299	297	259	262	334	290.2	N/A
476	298	296	261	262	333	290.0	N/A
477	298	296	258	262	333	289.4	N/A
478	298	296	261	262	333	290.0	N/A
479	298	296	261	262	332	289.8	N/A

WOODSTOVE SURFACE TEMPERATURE DATA

Client: IHP
Model: ST210GL
Run #: 2

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/10/2019

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
480	298	296	260	261	332	289.4	N/A
481	298	296	261	261	332	289.6	N/A
482	298	295	258	261	331	288.6	N/A
483	298	295	259	260	331	288.6	N/A
484	298	295	260	260	330	288.6	N/A
485	297	295	256	260	330	287.6	N/A
486	297	295	259	259	330	288.0	N/A
487	297	294	260	259	329	287.8	N/A
488	297	293	259	259	329	287.4	N/A
489	297	294	259	259	329	287.6	N/A
490	297	293	259	258	328	287.0	N/A
491	297	293	262	258	328	287.6	N/A
492	297	292	263	258	328	287.6	N/A
493	296	291	260	258	327	286.4	N/A
494	296	290	261	257	327	286.2	N/A
495	296	292	260	257	326	286.2	N/A
496	296	291	258	257	326	285.6	N/A
497	296	290	259	257	325	285.4	N/A
498	296	290	258	256	325	285.0	N/A
499	296	289	260	256	325	285.2	N/A
500	296	289	259	256	324	284.8	N/A
501	296	289	258	255	324	284.4	N/A
502	296	288	258	255	323	284.0	N/A
503	296	289	259	255	323	284.4	N/A
504	296	288	260	255	323	284.4	N/A
505	296	288	256	254	322	283.2	N/A
506	297	287	257	254	322	283.4	N/A
507	297	287	253	254	321	282.4	N/A
508	297	287	255	253	321	282.6	N/A
509	297	287	254	253	321	282.4	N/A
510	297	287	256	253	320	282.6	N/A
511	297	287	258	252	320	282.8	N/A
512	297	285	256	252	319	281.8	N/A
513	297	285	255	252	319	281.6	N/A
514	297	285	256	251	318	281.4	N/A
515	297	285	256	251	318	281.4	N/A
516	297	285	256	251	317	281.2	N/A
517	298	284	258	250	317	281.4	N/A
518	297	284	258	250	316	281.0	N/A
519	297	283	256	250	316	280.4	N/A
520	297	284	257	250	316	280.8	N/A
521	297	284	255	249	315	280.0	N/A
522	297	284	259	249	315	280.8	N/A
523	297	283	258	249	315	280.4	N/A
524	297	284	256	249	314	280.0	N/A
525	297	283	257	249	314	280.0	N/A
526	298	283	257	248	313	279.8	N/A
527	298	283	257	248	313	279.8	N/A

WOODSTOVE SURFACE TEMPERATURE DATA

Client: IHP
Model: ST210GL
Run #: 2

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/10/2019

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
528	298	282	258	248	313	279.8	N/A
529	298	282	258	247	312	279.4	N/A
530	298	282	256	247	312	279.0	N/A
531	298	282	256	247	312	279.0	N/A
532	298	281	254	247	311	278.2	N/A
533	298	281	253	246	311	277.8	N/A
534	298	281	256	246	311	278.4	N/A
535	298	281	254	246	310	277.8	N/A
536	298	281	253	246	310	277.6	N/A
537	298	280	253	245	309	277.0	N/A
538	298	281	256	245	309	277.8	N/A
539	298	280	257	245	309	277.8	N/A
540	298	280	255	245	308	277.2	N/A
541	297	280	254	245	308	276.8	N/A
542	297	280	256	244	308	277.0	N/A
543	297	280	256	244	307	276.8	N/A
544	297	280	256	243	307	276.6	N/A
545	296	279	256	243	307	276.2	N/A
546	296	279	254	243	306	275.6	N/A
547	296	279	254	242	306	275.4	N/A
548	296	279	255	242	306	275.6	N/A
549	295	279	250	242	306	274.4	N/A
550	295	278	254	241	305	274.6	N/A
551	294	278	254	241	305	274.4	N/A
552	294	279	250	240	305	273.6	N/A
553	294	278	252	240	304	273.6	N/A
554	293	278	251	240	304	273.2	N/A
555	293	277	252	239	304	273.0	N/A
556	293	277	254	239	304	273.4	N/A
557	292	277	252	238	303	272.4	N/A
558	292	276	251	238	303	272.0	N/A
559	291	276	253	237	303	272.0	N/A
560	291	275	251	237	302	271.2	N/A
561	290	275	251	236	302	270.8	N/A
562	290	275	251	236	302	270.8	N/A
563	289	274	252	235	302	270.4	N/A
564	289	274	250	234	301	269.6	N/A
565	288	273	251	234	301	269.4	N/A
566	287	273	252	233	300	269.0	N/A
567	286	273	250	233	300	268.4	N/A
568	286	272	249	232	300	267.8	N/A
569	285	271	250	231	300	267.4	N/A
570	284	272	249	231	299	267.0	N/A
571	283	270	247	230	299	265.8	N/A
572	282	270	249	229	299	265.8	N/A
573	282	269	247	229	298	265.0	N/A
574	281	269	247	228	298	264.6	N/A
575	280	268	248	227	297	264.0	N/A

WOODSTOVE SURFACE TEMPERATURE DATA

Client: IHP
Model: ST210GL
Run #: 2

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/10/2019

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
576	279	267	245	227	297	263.0	N/A
577	278	267	245	226	297	262.6	N/A
578	277	266	244	226	296	261.8	N/A
579	276	266	244	225	296	261.4	N/A
580	275	265	243	225	296	260.8	N/A
581	274	265	242	224	295	260.0	N/A
582	274	265	242	224	295	260.0	N/A
583	273	264	240	223	295	259.0	N/A
584	272	264	241	223	294	258.8	N/A
585	271	263	241	222	294	258.2	N/A
586	270	263	239	222	294	257.6	N/A
587	269	263	240	221	293	257.2	N/A
588	269	262	236	221	293	256.2	N/A
589	268	261	233	220	292	254.8	N/A
590	267	261	236	220	292	255.2	N/A
591	266	261	236	219	292	254.8	N/A
592	265	262	236	218	291	254.4	N/A
593	264	260	238	218	291	254.2	N/A
594	263	260	234	217	291	253.0	N/A
595	263	259	234	217	290	252.6	N/A
596	262	259	234	216	290	252.2	N/A
597	261	258	229	215	290	250.6	N/A
598	260	258	234	215	289	251.2	N/A
599	259	257	232	214	289	250.2	N/A
600	258	256	233	213	289	249.8	N/A
601	257	256	232	213	288	249.2	N/A
602	256	255	231	212	288	248.4	N/A
603	256	255	231	211	287	248.0	N/A
604	255	254	228	211	287	247.0	N/A
605	254	254	227	210	287	246.4	N/A
606	253	253	228	210	287	246.2	N/A
Average	356	350	291	406	361	353	N/A

LAB SAMPLE DATA - ASTM E2515

Client: IHP
Job #: 19-468
Model: ST210GL
Tracking #: 0026
Run #: 2
Technician: SJB
Date: 4/10/2019

TRAIN A (1st Hour)

Sample Component	Sample Type	Filter, Probe, or O-Ring #	Weights		
			Final, mg	Tare, mg	Particulate, mg
A. Front filter catch	Filter	T189/T190	181.2	177.6	3.6
B. Rear filter catch	Filter				0.0
C. Probe catch*	Probe				0.0
D. O-Ring catch*	O-Ring				0.0

Sub-Total	Total Particulate, mg:	3.6

TRAIN A (Post 1st hour)

Sample Component	Sample Type	Filter, Probe, or O-Ring #	Weights		
			Final, mg	Tare, mg	Particulate, mg
A. Front filter catch	Filter	T196	178.5	88.7	1.5
B. Rear filter catch	Filter	T191		88.3	
C. Probe catch*	Probe	12A	116888.6	116888.1	0.5
D. O-Ring catch*	O-Ring	12A	3418.0	3417.0	1.0

Sub-Total	Total Particulate, mg:	3.0
Train A Aggregate	Total Particulate, mg:	**6.6**

TRAIN B

Sample Component	Reagent	Filter, Probe, or O-Ring #	Weights		
			Final, mg	Tare, mg	Particulate, mg
A. Front filter catch	Filter	T192/T194/T195	360.2	266.6	4.6
B. Rear filter catch	Filter	T193		89.0	
C. Probe catch*	Probe	12B	117052.1	117051.7	0.4
D. O-Ring catch*	O-Ring	12B	3390.7	3389.5	1.2

Total Particulate, mg:	**6.2**

AMBIENT

Sample Component	Reagent	Filter, Probe, or O-Ring #	Weights		
			Final, mg	Tare, mg	Particulate, mg
A. Filter catch*	Filter				0.0

Total Particulate, mg:	**0.0**

*Particulate catch that results in a negative number, is assumed to be zero for probes and O-rings, negative numbers for filters are assumed to be part of the O-Ring weight.

ASTM E3053 Wood Heater Run Sheets

Client: IHP Job Number: 19-468 Tracking #: 0026
Model: ST210GL Run Number: 1 Test Date: 4/10/2019

Wood Heater Run Notes

Pre-Test Notes
Pre-Test Start Time: 10:03
Air Control Setting: Fully Open

Time	Notes
N/A	See test Run 1 notes for full detail, test Run 2 is being performed as a continuation of Run 1. With 2.8 lbs of fuel left, the coal bed was leveled, and the scale was zeroed in preparation of fuel loading.

Test Notes
Test Burn Start Time: 13:10
Air Control Setting: Fully Closed

Time	Notes
0 min	Loaded test fuel within 40 seconds, door closed immediately thereafter.
15 min	Closed air to low test setting, changed front filter on both trains.
60 min	Changed 1-hr filter
606 min	End of Test

Test Burn End Time: 11:16

Flue Gas Concentration Measurement

Calibration Gas Values: Span Gas CO_2 (%): 9.00 CO (%): 0.500
Mid Gas CO_2 (%): - CO (%): -

Calibration Results:

	Pre Test			Post Test		
	Zero	Mid	Span	Zero	Mid	Span
Time	8:30	-	8:36	4/11 – 8:26	-	4/11 – 8:29
CO_2	0.00	-	9.00	0.04	-	8.86
CO	0.00	-	0.500	0.008	-	0.492

Flue Gas Probe Leak Check: Initial: No Leakage Final: No Leakage

Technician Signature:  Date: 4/11/2019

ASTM E3053 Wood Heater Run Sheets

Client: IHP Job Number: 19-468 Tracking #: 0026
Model: ST210GL Run Number: 1 Test Date: 4/10/2019

Test Photos



Kindling Fuel Load



Start-up Fuel Load



High Fire Fuel Load



Residual Start-up Fuel Coal Bed

Technician Signature: _____ Date: 4/11/2019

ASTM E3053 Wood Heater Run Sheets

Client: IHP Job Number: 19-468 Tracking #: 0026
Model: ST210GL Run Number: 1 Test Date: 4/10/2019



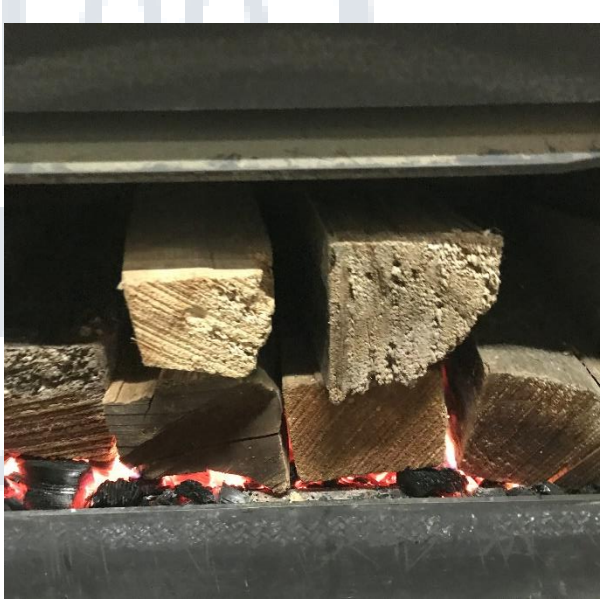
High Fire Fuel Loaded



Residual High Fire Load Coal Bed



Low Fire Fuel Load



Low Fire Fuel Loaded

Technician Signature: _____ Date: 4/11/2019

WOOD STOVE TEST DATA PACKET
ASTM E3053/E2515

Run 3 Data Summary

Client: IHP
Model: ST210GL
Job #: 19-468
Tracking #: 0026
Test Date: 4/11/2019

Techician Signature

4/19/2019
Date

TEST RESULTS - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 3

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/11/2019

Burn Rate (kg/hr):	**2.88**

	Ambient Sample	Sample Train A	Sample Train B	1st Hour Filter
Total Sample Volume (ft^3)	0.000	33.248	32.259	10.725
Average Gas Velocity in Dilution Tunnel (ft/sec)	17.07			
Average Gas Flow Rate in Dilution Tunnel (dscf/hr)	10774.1			
Average Gas Meter Temperature (°F)	70.9	71.8	68.6	65.9
Total Sample Volume (dscf)	0.000	32.347	32.152	10.553
Average Tunnel Temperature (°F)	115.2			
Total Time of Test (min)	186			
Total Particulate Catch (mg)	0.0	10.2	9.4	5.1
Particulate Concentration, dry-standard (g/dscf)	0.0000000	0.0003153	0.0002924	0.0004833
Total PM Emissions (g)	0.00	10.53	9.76	5.21
Particulate Emission Rate (g/hr)	0.00	3.40	3.15	5.21
Emissions Factor (g/kg)	-	1.12	1.04	-
Difference from Average Total Particulate Emissions (g)	-	0.38	0.38	-
Difference from Average Emissions Factor (g/kg)	-	0.04	0.04	-

Final Average Results	
Total Particulate Emissions (g)	10.15
Particulate Emission Rate (g/hr)	3.27
Emissions Factor (g/kg)	1.08
HHV Efficiency (%)	69.2%
LHV Efficiency (%)	74.8%
CO Emissions (g/min)	1.58

Quality Checks	**Requirement**	**Observed**	**Result**
Dual Train Precision	Each train within 7.5% of average emissions (in grams), or emission factors within 0.5 g/kg	See Above	OK
Filter Temps	>80 °F, <90 °F	Min: 80 / Max: 90	OK
Face Velocity	< 30 ft/min	9.6	OK
Leakage Rate	Less than 4% of average sample rate	0.003 cfm	OK
Ambient Temp	55-90 °F	Min: 58 / Max: 78	OK
Negative Probe Weight Evaluation	<5% of Total Catch	Probe Catch Not Negative	OK
Pro-Rate Variation	90% of readings between 90-110%; none greater than 120% or less than 80%	See Data Tabs	OK

B415.1 Efficiency Results

Manufacturer:	IHP
Model:	ST210GL
Date:	04/11/19
Run:	3
Control #:	19-468
Test Duration:	150
Output Category:	High

Test Results in Accordance with CSA B415.1-09

	HHV Basis	LHV Basis
Overall Efficiency	69.2%	74.8%
Combustion Efficiency	98.1%	98.1%
Heat Transfer Efficiency	70.6%	76.3%

Output Rate (kJ/h)	39,908	37,857	**(Btu/h)**
Burn Rate (kg/h)	2.91	6.41	**(lb/h)**
Input (kJ/h)	57,658	54,694	**(Btu/h)**

Test Load Weight (dry kg)	7.28	16.04	**dry lb**
MC wet (%)	16.04		
MC dry (%)	19.10		
Particulate (g)	10.15		
CO (g)	237		
Test Duration (h)	2.50		

Emissions	**Particulate**	**CO**
g/MJ Output	0.10	2.37
g/kg Dry Fuel	1.39	32.52
g/h	4.06	94.64
g/min	0.07	1.58
lb/MM Btu Output	0.24	5.51

Air/Fuel Ratio (A/F)	15.37

VERSION: **2.2** **12/14/2009**

HIGH FIRE FUEL LOAD DATA - ASTM E3053

Client: IHP
Job #: 19-468
Model: ST210GL
Tracking #: 0026
Run #: 3
Technician: SJB
Date: 4/11/2019

Nominal Loading Density (lbs/ft^3, wet basis):	10		
Usable Firebox Volume (ft^3):	2.12		
Target Load Weight (lbs):	21.20		
Total Load Weight Range (lbs):	20.10	to	22.30
Core Load Weight Range (lbs):	9.50	to	13.80
Remainder Load Weight Range (lbs):	7.40	to	11.70
Core Load Piece Range (lbs):	3.20	to	5.30
Remainder Load Piece Range (lbs):	2.10	to	11.70
Max Allowable Kindling Weight (lbs):	4.35		
Max Allowable Start-up Fuel Weight (lbs):	6.52		

CORE LOAD DATA

				Fuel Piece Moisture Readings (%DB)					Dry Weight	
Piece #	Length (in)	Weight (lbs)	Within Spec?	1	2	3	Ave.	Within Spec?	lbs	kg
1	15.00	5.25	In Range	17.6	18.7	19.7	18.7	In Range	4.42	2.01
2	15.00	3.40	In Range	19.8	19.4	18.8	19.3	In Range	2.85	1.29
3	15.00	4.88	In Range	18.0	17.8	19.1	18.3	In Range	4.13	1.87
Core Load Wt. (lbs)		13.53	In Range							

REMAINDER LOAD DATA (1 to 3 Pieces)

				Fuel Piece Moisture Readings (%DB)					Dry Weight	
Piece #	Length (in)	Weight (lbs)	Within Spec?	1	2	3	Ave.	Within Spec?	lbs	kg
1	15.00	3.05	In Range	23.2	23.9	18.6	21.9	In Range	2.50	1.13
2	15.00	5.15	In Range	19.8	18.3	17.5	18.5	In Range	4.34	1.97
3	15.00		NA				NA	NA	NA	NA
Remainder Load (lbs)		8.20	In Range							

Total Load Weight (lbs):	21.73	In Range	
Core Load % of Total Weight:	62%	In Range	45-65%
Remainder % of Total Weight:	38%	In Range	35-55%
Total Load % of Target Weight:	103%	In Range	95-105%
Actual Fuel Loading Density (lb/ft3):	10.3		
Total Load Average Moisture Conent (%DB):	19.1	In Range	19-25%
Total Load Average Moisture Conent (%WB):	16.0		
Total Test Load Weight (dry basis):	18.25 lbs	8.28 kg	

KINDLING AND START-UP FUEL

		Kindling Moisture Readings (%DB)					Dry Weight	
Kindling Weight (lbs)	Within Spec?	1	2	3	Avg.	Within Spec?	lbs	kg
3.29	In Range	10	10	10	10.0	In Range	2.99	1.36

		Start-up Moisture Readings (%DB)					Dry Weight	
Start-up Fuel Wt. (lb)	Within Spec?	1	2	3	Avg.	Within Spec?	lbs	kg
4.88	In Range	24.2	22.3	23.7	23.4	In Range	3.95	1.79

TEST FUEL LOADING RANGE

Allowable Residual Start-up Fuel Range (lb):	2.2	to	4.3	
Actual Residual Start-up Fuel Weight (lb):		2.2		In Range

TEST END POINT

High Fire Test Run End Point Range:	2.0	to	2.4	lb
Actual Fuel Load Ending Weight (lb):		2.4		In Range

Total Weight All Fuel Added: 29.90 lbs, wet basis
25.19 lbs, dry basis
11.43 kg, dry basis

Total Weight All Fuel Burned (dry basis): 20.60 lbs
9.34 kg

DILUTION TUNNEL & MISC. DATA - ASTM E3053 / E2515

Client:	IHP	Job #:	19-468
Model:	ST210GL	Tracking #:	0026
Run #:	3	Technician:	SJB
Test Start Time:	8:40	Date:	4/11/2019
Test Type:	High Fire		

Recording Interval (min):	1
Total Sampling Time (min):	186
High Fire Test Load Time (min):	36

Meter Box γ Factor:	0.986	(A)
Meter Box γ Factor:	1.004	(B)
Meter Box γ Factor:	1.000	(Ambient)

	Pre-Test	Post Test	Avg.
Barometric Pressure (in. Hg)	29.74	29.7	29.72
Relative Humidity (%)	29.4	28.6	
Room Air Velocity (ft/min)	0	0	
Scale Audit (lbs)	10.0	10.0	

Ambient Sample Volume: 0.000 ft^3

Induced Draft Check (in. H_2O):	0
Smoke Capture Check (%):	100%
Date Flue Pipe Last Cleaned:	4/10/2019

Sample Train Post-Test Leak Checks

(A)	0.000	cfm @	-8	in. Hg
(B)	0.003	cfm @	-10	in. Hg
(Ambient)	0.000	cfm @	0	in. Hg

DILUTION TUNNEL FLOW

Traverse Data

Point	dP (in H_2O)	Temp (°F)
1	0.060	60
2	0.068	60
3	0.058	60
4	0.060	60
5	0.052	60
6	0.070	60
7	0.060	60
8	0.048	60
Center	0.070	60

Static Pressure: -0.300 in. H_2O

Dilution Tunnel H_2O:	2.00	percent
Tunnel Diameter:	6	inches
Pitot Tube Cp:	0.99	[unitless]
Dilution Tunnel MW(dry):	29.00	lb/lb-mole
Dilution Tunnel MW(wet):	28.78	lb/lb-mole
Tunnel Area:	0.1963	ft^2
V_{strav}:	16.22	ft/sec
V_{scent}:	17.46	ft/sec
F_p:	0.929	[ratio]
Initial Tunnel Flow:	187.1	scf/min

TEST FUEL PROPERTIES

ASTM 3053-17 - Table A1.1 Fuel Properties by Fuel Species

Select Fuel Type	Species	%C	%H	%O	%Ash	MJ/kg	BTU/lb
	Ash, White	49.70	6.90	43.00	0.30	20.75	8927
	Beech	48.70	5.80	44.70	0.60	18.80	8088
	Birch, Sweet	49.80	6.50	43.40	0.30	20.12	8656
	Birch, Yellow	49.80	6.50	43.40	0.30	20.12	8656
X	Doug Fir (Coast, Interior West/North)	48.73	6.87	43.90	0.50	19.81	8522
	Doug Fir (Interioir South)	48.73	6.87	43.90	0.50	19.81	8522
	Elm, Rock	50.40	6.60	42.30	0.70	20.49	8815
	Elm, Soft	50.40	6.60	42.30	0.70	20.49	8815
	Gum, Red	50.88	6.06	41.57	1.28	19.72	8478
	Larch, Western	50.54	6.36	42.40	0.70	17.58	7558
	Maple, Hard	50.64	6.02	41.74	1.35	19.96	8587
	Maple, Sugar	50.64	6.02	41.74	1.35	19.96	8587
	Oak, Red	49.50	6.62	43.70	0.20	20.20	8690
	Oak, White	50.40	6.59	42.70	0.20	20.50	8819
	Pine, Southern	52.60	7.00	40.10	1.31	22.30	9587
	Pine, Southern Long Leaf	52.60	7.02	40.10	1.30	22.30	9594
	Other						

WOODSTOVE PREBURN DATA

Client: IHP
Model: ST210GL
Run #: 3

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/11/2019

High Fire Test Begins from Cold Start, No Preburn is Performed

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 3

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/11/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
0	0.000		0.070	0.00	62	-0.93		8.2		60	62	87	58
1	0.179	0.179	0.070	0.39	62	-0.73	99	7.9	-0.3	79	157	80	58
2	0.358	0.179	0.070	0.37	62	-0.4	99	7.8	-0.1	77	238	80	58
3	0.536	0.178	0.070	0.40	62	0.27	99	7.5	-0.3	83	347	80	59
4	0.715	0.179	0.070	0.38	62	-0.17	100	7.3	-0.2	93	432	82	59
5	0.894	0.179	0.070	0.38	62	-0.11	101	7.0	-0.3	101	482	83	60
6	1.073	0.179	0.070	0.38	62	0.43	101	6.8	-0.2	107	516	84	61
7	1.251	0.178	0.070	0.38	62	0.35	101	6.7	-0.1	112	530	85	61
8	1.430	0.179	0.070	0.38	62	-0.72	102	6.4	-0.3	115	533	85	62
9	1.609	0.179	0.070	0.38	63	-0.69	102	6.2	-0.2	116	521	86	63
10	1.788	0.179	0.070	0.38	63	-0.42	102	5.8	-0.4	119	529	86	63
11	1.966	0.178	0.070	0.37	63	-0.59	102	5.6	-0.2	120	523	86	63
12	2.145	0.179	0.070	0.40	63	0.08	102	5.4	-0.2	120	514	87	64
13	2.324	0.179	0.070	0.40	63	0.56	102	5.1	-0.3	120	515	87	64
14	2.503	0.179	0.070	0.40	63	0.16	102	4.9	-0.2	120	506	86	64
15	2.681	0.178	0.070	0.40	63	0.65	102	4.6	-0.3	121	514	86	64
16	2.860	0.179	0.070	0.39	63	-0.47	102	4.5	-0.1	122	525	86	65
17	3.039	0.179	0.070	0.40	64	0.2	102	4.3	-0.2	121	506	86	65
18	3.218	0.179	0.070	0.40	64	0.37	102	4.0	-0.3	120	502	86	65
19	3.396	0.178	0.070	0.40	64	0.68	101	4.1	0.1	119	495	86	66
20	3.575	0.179	0.070	0.40	64	-0.59	102	3.9	-0.2	118	481	86	65
21	3.754	0.179	0.070	0.40	64	-0.13	102	3.4	-0.5	117	471	86	65
22	3.933	0.179	0.070	0.40	64	-0.63	102	3.5	0.1	114	451	85	65
23	4.111	0.178	0.070	0.39	65	-0.09	101	3.4	-0.1	112	438	85	66
24	4.290	0.179	0.070	0.40	65	0.57	101	3.2	-0.2	110	423	85	66
25	4.469	0.179	0.070	0.40	65	-0.46	101	3.2	0	108	404	85	66
26	4.648	0.179	0.070	0.40	65	0.67	101	3.3	0.1	106	385	84	67
27	4.826	0.178	0.070	0.40	65	0.2	100	2.8	-0.5	104	374	84	66
28	5.005	0.179	0.070	0.40	65	-0.52	100	2.8	0	103	366	84	66
29	5.184	0.179	0.070	0.39	66	-0.04	100	2.8	0	102	363	84	65
30	5.363	0.179	0.070	0.40	66	0.5	100	2.7	-0.1	102	366	84	66
31	5.541	0.178	0.070	0.39	66	0.58	99	2.5	-0.2	101	359	84	66
32	5.720	0.179	0.070	0.39	66	0.64	100	2.5	0	100	357	84	66

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 3

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/11/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
33	5.899	0.179	0.070	0.39	66	0.16	100	2.4	-0.1	100	358	83	66
34	6.078	0.179	0.070	0.38	67	-0.05	100	2.3	-0.1	100	351	83	66
35	6.256	0.178	0.070	0.39	67	0.69	99	2.1	-0.2	98	346	83	66
36	6.435	0.179	0.070	0.33	67	1.32	104	23.8	21.7	149	423	86	68
37	6.614	0.179	0.070	0.39	67	1.06	102	23.6	-0.2	122	364	85	67
38	6.793	0.179	0.070	0.39	67	1.82	101	23.3	-0.3	111	352	84	67
39	6.971	0.178	0.070	0.36	67	2.08	100	23.3	0	107	355	84	66
40	7.150	0.179	0.070	0.52	68	0.24	100	23.2	-0.1	106	374	81	67
41	7.329	0.179	0.070	0.39	68	-0.29	100	23.0	-0.2	107	401	82	67
42	7.508	0.179	0.070	0.39	68	0.27	100	22.7	-0.3	108	415	83	67
43	7.686	0.178	0.070	0.39	68	-0.56	100	22.8	0.1	108	419	83	67
44	7.865	0.179	0.070	0.39	68	0.19	100	22.6	-0.2	109	428	83	67
45	8.044	0.179	0.070	0.39	68	0.38	100	22.5	-0.1	110	440	84	67
46	8.223	0.179	0.070	0.39	68	0.11	101	22.3	-0.2	112	445	84	67
47	8.401	0.178	0.070	0.39	69	0.28	100	22.1	-0.2	112	452	84	67
48	8.580	0.179	0.070	0.39	69	0.36	100	21.9	-0.2	113	459	84	68
49	8.759	0.179	0.070	0.39	69	0.31	101	21.8	-0.1	114	463	85	68
50	8.938	0.179	0.070	0.38	69	0.3	101	21.7	-0.1	115	468	85	68
51	9.116	0.178	0.070	0.38	69	-0.67	100	21.5	-0.2	116	474	85	68
52	9.295	0.179	0.070	0.38	69	0.29	101	21.3	-0.2	117	484	85	69
53	9.474	0.179	0.070	0.38	69	0.32	101	21.0	-0.3	118	492	85	68
54	9.653	0.179	0.070	0.38	70	0.34	101	20.9	-0.1	119	496	85	68
55	9.831	0.178	0.070	0.38	70	-0.18	100	20.8	-0.1	120	502	85	68
56	10.010	0.179	0.070	0.38	70	-0.51	101	20.4	-0.4	121	503	84	68
57	10.189	0.179	0.070	0.38	70	0.13	101	20.2	-0.2	122	507	84	68
58	10.368	0.179	0.070	0.40	70	0.37	101	20.1	-0.1	122	509	84	68
59	10.546	0.178	0.070	0.40	70	-0.79	101	19.9	-0.2	124	514	84	69
60	10.725	0.179	0.070	0.39	70	0.09	101	19.8	-0.1	124	519	85	70
61	10.904	0.179	0.070	0.39	70	-0.31	101	19.6	-0.2	125	524	85	69
62	11.083	0.179	0.070	0.39	70	-0.36	101	19.4	-0.2	126	529	85	70
63	11.261	0.178	0.070	0.39	71	-0.58	101	19.2	-0.2	127	532	85	70
64	11.440	0.179	0.070	0.38	71	0.37	101	18.8	-0.4	127	536	85	69
65	11.619	0.179	0.070	0.38	71	-0.35	101	18.7	-0.1	128	539	84	70

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 3

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/11/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
66	11.798	0.179	0.070	0.38	71	-0.67	101	18.5	-0.2	129	542	84	70
67	11.976	0.178	0.070	0.38	71	0.37	101	18.3	-0.2	129	545	84	71
68	12.155	0.179	0.070	0.39	71	-0.17	102	18.1	-0.2	130	548	84	71
69	12.334	0.179	0.070	0.40	71	0.23	102	17.8	-0.3	131	549	84	72
70	12.513	0.179	0.070	0.40	71	0.6	102	17.7	-0.1	131	551	83	72
71	12.691	0.178	0.070	0.39	71	-0.61	101	17.4	-0.3	132	551	83	72
72	12.870	0.179	0.070	0.40	71	0.29	102	18.0	0.6	131	555	83	72
73	13.049	0.179	0.070	0.39	72	-0.03	101	17.0	-1	131	553	83	72
74	13.228	0.179	0.070	0.40	72	-0.61	101	17.1	0.1	131	549	83	72
75	13.406	0.178	0.070	0.40	72	-0.05	101	16.7	-0.4	132	553	84	71
76	13.585	0.179	0.070	0.39	72	-0.16	102	16.4	-0.3	133	555	85	72
77	13.764	0.179	0.070	0.39	72	0.5	102	16.3	-0.1	134	558	86	73
78	13.943	0.179	0.070	0.39	72	0.69	102	15.9	-0.4	134	562	86	74
79	14.121	0.178	0.070	0.39	72	0.7	101	16.7	0.8	135	562	86	73
80	14.300	0.179	0.070	0.39	72	0.71	102	16.1	-0.6	135	565	86	74
81	14.479	0.179	0.070	0.39	72	-0.51	102	15.6	-0.5	136	566	86	75
82	14.658	0.179	0.070	0.39	72	-0.17	102	15.5	-0.1	135	569	86	73
83	14.836	0.178	0.070	0.39	72	-0.25	101	15.0	-0.5	136	567	85	74
84	15.015	0.179	0.070	0.39	73	-0.29	102	15.2	0.2	135	568	85	75
85	15.194	0.179	0.070	0.39	73	-0.52	102	14.6	-0.6	136	570	85	74
86	15.373	0.179	0.070	0.38	73	0.56	102	14.3	-0.3	136	565	85	74
87	15.551	0.178	0.070	0.38	73	0.53	101	14.1	-0.2	136	561	85	74
88	15.730	0.179	0.070	0.39	73	0.52	102	14.0	-0.1	135	558	85	75
89	15.909	0.179	0.070	0.39	73	0.52	102	13.9	-0.1	134	554	85	74
90	16.088	0.179	0.070	0.39	73	0.58	102	13.7	-0.2	134	550	85	75
91	16.266	0.178	0.070	0.38	73	-0.17	101	13.4	-0.3	134	544	85	75
92	16.445	0.179	0.070	0.38	73	-0.47	101	13.3	-0.1	133	543	85	75
93	16.624	0.179	0.070	0.38	73	0.47	101	13.2	-0.1	133	538	85	76
94	16.803	0.179	0.070	0.38	73	-0.43	101	13.0	-0.2	132	536	85	75
95	16.982	0.179	0.070	0.38	73	0.44	101	12.7	-0.3	132	534	85	75
96	17.160	0.178	0.070	0.38	74	-0.05	101	12.5	-0.2	131	532	85	75
97	17.339	0.179	0.070	0.38	74	-0.55	101	12.2	-0.3	131	532	85	76
98	17.518	0.179	0.070	0.38	74	0.74	101	12.3	0.1	130	531	84	75

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 3

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/11/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
99	17.697	0.179	0.070	0.38	74	0.42	101	12.1	-0.2	130	529	84	76
100	17.875	0.178	0.070	0.38	74	-0.41	100	11.8	-0.3	130	527	84	76
101	18.054	0.179	0.070	0.38	74	-0.11	101	11.7	-0.1	130	525	84	76
102	18.233	0.179	0.070	0.38	74	-0.29	101	11.7	0	130	525	84	76
103	18.412	0.179	0.070	0.38	74	0.85	101	11.5	-0.2	129	523	84	77
104	18.590	0.178	0.070	0.38	74	0.76	100	11.3	-0.2	129	518	84	76
105	18.769	0.179	0.070	0.38	74	-0.06	101	10.6	-0.7	128	515	84	75
106	18.948	0.179	0.070	0.38	74	-0.25	101	11.1	0.5	128	511	84	77
107	19.127	0.179	0.070	0.38	74	-0.23	101	10.8	-0.3	127	505	84	76
108	19.305	0.178	0.070	0.38	74	0.01	100	10.6	-0.2	126	502	84	75
109	19.484	0.179	0.070	0.38	74	0.09	101	10.6	0	127	503	84	76
110	19.663	0.179	0.070	0.38	75	-0.35	100	10.7	0.1	125	500	84	76
111	19.842	0.179	0.070	0.38	75	0.79	100	10.3	-0.4	126	497	83	76
112	20.020	0.178	0.070	0.38	75	-0.13	100	9.9	-0.4	124	491	83	76
113	20.199	0.179	0.070	0.38	75	-0.22	100	10.0	0.1	124	489	83	75
114	20.378	0.179	0.070	0.38	75	0.4	100	9.8	-0.2	123	485	83	76
115	20.557	0.179	0.070	0.38	75	0.11	100	9.5	-0.3	123	486	83	78
116	20.735	0.178	0.070	0.38	75	0.04	100	9.8	0.3	123	485	83	76
117	20.914	0.179	0.070	0.37	75	0.06	100	9.5	-0.3	122	488	83	76
118	21.093	0.179	0.070	0.38	75	0.08	100	8.7	-0.8	122	486	83	75
119	21.272	0.179	0.070	0.37	75	-0.19	100	9.1	0.4	122	485	83	76
120	21.450	0.178	0.070	0.37	75	0.47	100	9.1	0	122	486	83	76
121	21.629	0.179	0.070	0.37	75	0.68	100	9.0	-0.1	122	485	83	76
122	21.808	0.179	0.070	0.37	75	-0.39	100	8.9	-0.1	121	482	83	76
123	21.987	0.179	0.070	0.38	75	-0.41	100	8.8	-0.1	121	475	83	75
124	22.165	0.178	0.070	0.38	75	0.4	99	8.6	-0.2	119	460	83	76
125	22.344	0.179	0.070	0.38	75	-0.02	100	8.6	0	118	452	83	77
126	22.523	0.179	0.070	0.38	75	-0.49	100	8.5	-0.1	117	446	83	77
127	22.702	0.179	0.070	0.38	76	0.74	99	8.5	0	116	440	83	75
128	22.880	0.178	0.070	0.38	76	0.4	99	8.5	0	115	432	83	76
129	23.059	0.179	0.070	0.38	76	0.29	99	8.1	-0.4	114	426	83	76
130	23.238	0.179	0.070	0.40	76	0.02	99	8.0	-0.1	114	419	84	75
131	23.417	0.179	0.070	0.40	76	-0.43	99	8.1	0.1	113	414	85	75

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 3

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/11/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
132	23.595	0.178	0.070	0.40	76	1.15	99	8.0	-0.1	112	408	85	75
133	23.774	0.179	0.070	0.39	76	-0.16	99	8.5	0.5	111	402	85	75
134	23.953	0.179	0.070	0.40	76	0.24	99	7.8	-0.7	110	397	85	75
135	24.132	0.179	0.070	0.40	76	0.82	99	7.8	0	109	392	84	75
136	24.310	0.178	0.070	0.40	76	0	98	7.8	0	108	389	84	74
137	24.489	0.179	0.070	0.40	76	0.71	99	7.6	-0.2	108	385	84	74
138	24.668	0.179	0.070	0.40	76	-0.04	99	8.0	0.4	107	383	84	73
139	24.847	0.179	0.070	0.40	76	0.63	99	7.6	-0.4	107	379	83	74
140	25.025	0.178	0.070	0.46	76	-0.47	98	7.3	-0.3	106	378	83	73
141	25.204	0.179	0.070	0.38	76	0.64	99	7.3	0	106	374	83	73
142	25.383	0.179	0.070	0.39	76	-0.22	98	7.6	0.3	105	373	83	73
143	25.562	0.179	0.070	0.39	76	0.87	98	7.2	-0.4	104	371	83	74
144	25.740	0.178	0.070	0.39	76	0.44	98	7.2	0	104	371	83	73
145	25.919	0.179	0.070	0.39	76	0.04	98	7.0	-0.2	104	369	83	73
146	26.098	0.179	0.070	0.39	76	0.01	98	7.0	0	104	368	83	73
147	26.277	0.179	0.070	0.39	76	1.06	98	6.9	-0.1	104	368	83	72
148	26.455	0.178	0.070	0.39	76	0.13	98	7.0	0.1	104	367	83	73
149	26.634	0.179	0.070	0.39	76	0.53	98	6.8	-0.2	103	366	83	73
150	26.813	0.179	0.070	0.39	76	-0.27	98	7.0	0.2	104	365	83	73
151	26.992	0.179	0.070	0.39	76	0.16	98	6.8	-0.2	103	365	83	73
152	27.170	0.178	0.070	0.39	76	0.32	98	6.8	0	104	367	83	74
153	27.349	0.179	0.070	0.39	76	1.03	98	6.6	-0.2	104	372	83	73
154	27.528	0.179	0.070	0.39	76	-0.17	98	6.6	0	104	377	83	73
155	27.707	0.179	0.070	0.39	76	-0.1	98	6.5	-0.1	104	380	83	73
156	27.885	0.178	0.070	0.38	76	0.96	98	6.4	-0.1	104	384	83	72
157	28.064	0.179	0.070	0.39	76	0.95	98	6.3	-0.1	105	389	83	72
158	28.243	0.179	0.070	0.39	76	1.03	98	6.2	-0.1	104	387	82	73
159	28.422	0.179	0.070	0.39	76	0.38	98	6.1	-0.1	105	385	82	73
160	28.600	0.178	0.070	0.38	76	0.57	98	6.1	0	104	382	82	72
161	28.779	0.179	0.070	0.39	76	-0.1	98	6.1	0	104	377	82	72
162	28.958	0.179	0.070	0.38	76	-0.22	98	6.3	0.2	104	375	82	72
163	29.137	0.179	0.070	0.39	77	0.86	98	5.9	-0.4	104	375	82	72
164	29.315	0.178	0.070	0.39	77	1.01	98	5.9	0	103	373	82	72

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 3

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/11/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
165	29.494	0.179	0.070	0.39	77	-0.12	98	5.8	-0.1	103	374	82	72
166	29.673	0.179	0.070	0.38	77	0.24	98	5.6	-0.2	103	374	82	72
167	29.852	0.179	0.070	0.39	77	0.21	98	5.4	-0.2	103	374	82	72
168	30.030	0.178	0.070	0.38	77	0.38	98	5.6	0.2	103	375	83	72
169	30.209	0.179	0.070	0.38	77	0.96	98	5.5	-0.1	103	374	83	72
170	30.388	0.179	0.070	0.38	77	0.97	98	5.4	-0.1	103	375	83	71
171	30.567	0.179	0.070	0.39	77	0.67	98	5.4	0	103	375	84	73
172	30.745	0.178	0.070	0.38	77	-0.1	98	5.4	0	103	375	85	73
173	30.924	0.179	0.070	0.38	77	0.75	98	5.2	-0.2	103	375	85	72
174	31.103	0.179	0.070	0.38	77	0.62	98	5.2	0	103	373	85	72
175	31.282	0.179	0.070	0.38	77	0.94	98	5.1	-0.1	103	366	85	72
176	31.460	0.178	0.070	0.38	77	-0.21	97	5.1	0	102	361	84	72
177	31.639	0.179	0.070	0.38	77	0.97	98	4.8	-0.3	102	356	83	72
178	31.818	0.179	0.070	0.38	77	0.6	98	4.9	0.1	101	352	83	72
179	31.997	0.179	0.070	0.38	77	-0.16	98	4.9	0	101	349	83	72
180	32.175	0.178	0.070	0.38	77	0.3	97	4.9	0	101	347	82	72
181	32.354	0.179	0.070	0.38	77	0.11	98	4.8	-0.1	100	346	82	72
182	32.533	0.179	0.070	0.38	77	0.93	98	4.8	0	100	346	82	72
183	32.712	0.179	0.070	0.39	77	0.11	98	4.7	-0.1	100	346	82	72
184	32.890	0.178	0.070	0.39	77	-0.07	97	4.7	0	99	344	82	71
185	33.069	0.179	0.070	0.39	77	1.21	98	4.7	0	99	344	82	72
186	33.248	0.179	0.070	0.38	77	-0.09	98	4.7	0	99	342	82	71
Avg/Tot	33.248	0.179	0.070	0.39	72	0.18	100			115	448	84	70.9

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 3

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/11/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
0	0.000		0.00	61	0		84	0.000	0.16	0.00
1	0.173	0.173	0.41	61	2.08	98	81	-0.030	1.48	0.04
2	0.347	0.174	0.40	61	2.12	98	80	-0.050	6.16	0.27
3	0.520	0.173	0.40	61	1.85	98	81	-0.070	8.02	0.34
4	0.694	0.174	0.41	61	0.14	100	82	-0.080	9.25	0.46
5	0.867	0.173	0.40	61	0.84	100	83	-0.080	11.04	0.58
6	1.041	0.174	0.40	61	0.26	101	85	-0.090	11.48	0.85
7	1.214	0.173	0.40	61	0.77	101	85	-0.080	11.71	0.77
8	1.387	0.173	0.39	61	0.29	101	86	-0.080	12.18	0.92
9	1.561	0.174	0.40	61	2.25	102	86	-0.080	12.11	0.67
10	1.734	0.173	0.39	61	2.31	102	87	-0.080	12.23	0.72
11	1.908	0.174	0.40	61	1.19	102	87	-0.080	11.37	0.43
12	2.081	0.173	0.40	61	0.14	102	87	-0.070	11.70	0.42
13	2.255	0.174	0.40	61	2.34	102	87	-0.080	11.81	0.26
14	2.428	0.173	0.40	61	1.16	102	87	-0.080	10.80	0.35
15	2.602	0.174	0.41	61	1.05	102	87	-0.080	11.03	0.39
16	2.775	0.173	0.40	61	1.06	102	87	-0.080	10.81	0.56
17	2.948	0.173	0.41	61	2.28	102	86	-0.080	11.68	0.37
18	3.122	0.174	0.41	62	1.63	102	86	-0.080	11.30	0.25
19	3.295	0.173	0.40	62	1.62	101	86	-0.080	10.17	0.23
20	3.469	0.174	0.41	62	0.61	102	86	-0.080	10.68	0.15
21	3.642	0.173	0.40	62	1.03	101	86	-0.080	10.10	0.17
22	3.816	0.174	0.40	62	0.98	101	86	-0.070	9.70	0.20
23	3.989	0.173	0.40	62	2.31	101	86	-0.070	9.16	0.39
24	4.162	0.173	0.41	62	1.37	101	85	-0.060	8.51	0.48
25	4.336	0.174	0.40	63	0.84	101	85	-0.070	8.40	0.42
26	4.509	0.173	0.40	63	0.14	100	85	-0.070	7.20	0.43
27	4.683	0.174	0.41	63	0.92	100	84	-0.060	6.45	0.59
28	4.856	0.173	0.40	63	1	100	84	-0.070	6.07	0.73
29	5.030	0.174	0.40	63	2.28	100	84	-0.070	6.07	0.74
30	5.203	0.173	0.40	63	1.06	100	84	-0.060	6.26	0.73
31	5.377	0.174	0.40	63	2.35	100	84	-0.060	6.40	0.75

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 3

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/11/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
32	5.550	0.173	0.39	64	1.57	99	84	-0.070	6.83	0.62
33	5.723	0.173	0.40	64	1.04	99	83	-0.060	6.07	0.77
34	5.897	0.174	0.39	64	2.12	100	83	-0.060	6.75	0.51
35	6.070	0.173	0.44	64	2.35	99	83	-0.060	6.52	0.55
36	6.244	0.174	0.34	64	1.8	104	85	-0.040	6.00	0.68
37	6.417	0.173	0.40	64	3.11	101	86	-0.060	5.74	0.74
38	6.591	0.174	0.40	64	3.86	101	85	-0.060	4.56	0.25
39	6.764	0.173	0.36	64	3.33	100	84	-0.070	3.54	0.27
40	6.937	0.173	0.33	65	4.25	100	84	-0.060	4.07	0.30
41	7.111	0.174	0.53	65	1.04	100	82	-0.070	4.45	0.32
42	7.284	0.173	0.41	65	0.81	100	82	-0.070	5.04	0.28
43	7.458	0.174	0.40	65	1.97	100	83	-0.070	5.67	0.30
44	7.631	0.173	0.40	65	-0.16	100	84	-0.070	6.31	0.25
45	7.805	0.174	0.40	65	0.23	101	85	-0.070	6.77	0.26
46	7.978	0.173	0.41	65	1.7	100	86	-0.080	6.99	0.28
47	8.151	0.173	0.41	65	1.96	100	87	-0.080	6.85	0.30
48	8.325	0.174	0.39	66	1.86	101	87	-0.080	6.88	0.27
49	8.498	0.173	0.40	66	0.18	100	88	-0.080	7.15	0.22
50	8.672	0.174	0.40	66	0.11	101	88	-0.070	7.22	0.21
51	8.845	0.173	0.40	66	0.77	100	88	-0.080	7.29	0.20
52	9.019	0.174	0.39	66	0.63	101	88	-0.080	7.41	0.21
53	9.192	0.173	0.40	66	-0.19	100	88	-0.070	7.41	0.18
54	9.366	0.174	0.39	66	-0.06	101	89	-0.080	7.61	0.16
55	9.539	0.173	0.40	66	1.02	101	89	-0.080	7.50	0.18
56	9.712	0.173	0.39	66	1.39	101	88	-0.080	7.51	0.17
57	9.886	0.174	0.40	66	1.64	101	87	-0.070	7.63	0.15
58	10.059	0.173	0.41	67	0.34	101	86	-0.080	7.62	0.18
59	10.233	0.174	0.41	67	1.91	101	87	-0.080	7.79	0.15
60	10.406	0.173	0.40	67	0.86	101	88	-0.080	7.82	0.16
61	10.580	0.174	0.40	67	2.22	101	89	-0.080	7.98	0.16
62	10.753	0.173	0.39	67	-0.05	101	89	-0.080	8.08	0.15
63	10.926	0.173	0.39	67	2.16	101	88	-0.070	8.13	0.15

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 3

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/11/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
64	11.100	0.174	0.39	67	1.94	102	88	-0.090	8.27	0.14
65	11.273	0.173	0.40	67	-0.11	101	87	-0.080	8.25	0.15
66	11.447	0.174	0.39	67	1.18	102	86	-0.080	8.27	0.16
67	11.620	0.173	0.39	67	0.06	101	86	-0.080	8.47	0.15
68	11.794	0.174	0.41	68	2.27	102	85	-0.080	8.66	0.12
69	11.967	0.173	0.41	68	0.94	101	84	-0.080	8.94	0.12
70	12.140	0.173	0.41	68	0.9	101	84	-0.080	9.23	0.09
71	12.314	0.174	0.42	68	1.29	102	83	-0.080	9.28	0.11
72	12.487	0.173	0.41	68	0.04	101	83	-0.080	9.62	0.13
73	12.661	0.174	0.41	68	1.15	102	83	-0.080	9.66	0.16
74	12.834	0.173	0.41	68	2.19	101	83	-0.080	9.93	0.14
75	13.008	0.174	0.41	68	1.19	102	84	-0.080	10.04	0.20
76	13.181	0.173	0.40	68	1.87	101	86	-0.080	10.07	0.18
77	13.355	0.174	0.41	68	2.2	102	88	-0.090	10.26	0.17
78	13.528	0.173	0.40	68	2.3	101	88	-0.080	10.13	0.18
79	13.701	0.173	0.40	69	1.22	101	88	-0.080	10.18	0.17
80	13.875	0.174	0.40	69	1.02	102	88	-0.080	10.24	0.11
81	14.048	0.173	0.40	69	1.99	101	87	-0.080	10.47	0.13
82	14.222	0.174	0.41	69	1.75	102	87	-0.080	10.58	0.15
83	14.395	0.173	0.41	69	1.55	101	86	-0.080	10.64	0.17
84	14.569	0.174	0.40	69	1.07	102	86	-0.090	10.77	0.18
85	14.742	0.173	0.41	69	1.69	101	86	-0.080	10.88	0.14
86	14.915	0.173	0.40	69	2.4	101	86	-0.080	10.84	0.16
87	15.089	0.174	0.40	69	0.83	102	85	-0.080	10.92	0.14
88	15.262	0.173	0.41	69	2.13	101	85	-0.080	11.04	0.15
89	15.436	0.174	0.40	69	1.28	102	85	-0.080	10.92	0.16
90	15.609	0.173	0.40	69	0.14	101	85	-0.090	10.91	0.14
91	15.783	0.174	0.40	70	1.74	102	85	-0.080	10.89	0.13
92	15.956	0.173	0.40	70	1.57	101	85	-0.080	10.68	0.15
93	16.130	0.174	0.40	70	1.02	102	85	-0.090	10.63	0.15
94	16.303	0.173	0.40	70	2.35	101	85	-0.080	10.60	0.13
95	16.476	0.173	0.40	70	0.11	101	84	-0.090	10.47	0.11

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Job #: 19-468
Model: ST210GL
Tracking #: 0026
Run #: 3
Technician: SJB
Date: 4/11/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
96	16.650	0.174	0.40	70	2.33	101	85	-0.070	10.26	0.07
97	16.823	0.173	0.40	70	2.19	101	85	-0.080	10.16	0.11
98	16.997	0.174	0.40	70	0.08	101	85	-0.080	10.14	0.10
99	17.170	0.173	0.40	70	1.68	101	85	-0.080	10.00	0.08
100	17.344	0.174	0.40	70	0.93	101	85	-0.080	10.05	0.09
101	17.517	0.173	0.41	70	0.99	101	85	-0.080	9.99	0.08
102	17.690	0.173	0.40	70	1.87	101	85	-0.080	9.96	0.10
103	17.864	0.174	0.40	71	1.82	101	84	-0.080	10.00	0.06
104	18.037	0.173	0.40	71	1.98	100	85	-0.080	9.99	0.07
105	18.211	0.174	0.40	71	2.3	101	85	-0.070	9.87	0.08
106	18.384	0.173	0.40	71	1	100	84	-0.080	9.88	0.11
107	18.558	0.174	0.40	71	2.33	101	84	-0.070	9.80	0.07
108	18.731	0.173	0.39	71	0.25	100	84	-0.080	9.75	0.08
109	18.904	0.173	0.39	71	1.24	100	84	-0.080	9.55	0.10
110	19.078	0.174	0.40	71	1.27	101	84	-0.070	9.45	0.05
111	19.251	0.173	0.39	71	1.15	100	84	-0.070	9.30	0.05
112	19.425	0.174	0.39	71	2.02	101	84	-0.080	9.23	0.07
113	19.598	0.173	0.39	71	2.12	100	84	-0.080	9.29	0.07
114	19.772	0.174	0.40	71	1.84	101	84	-0.070	9.29	0.02
115	19.945	0.173	0.40	71	1.52	100	84	-0.080	9.29	0.04
116	20.119	0.174	0.40	71	0.82	101	83	-0.070	9.17	0.06
117	20.292	0.173	0.40	72	1.33	100	83	-0.070	9.13	0.07
118	20.465	0.173	0.39	72	1.26	100	83	-0.070	9.08	0.03
119	20.639	0.174	0.39	72	0.68	100	83	-0.080	9.03	0.06
120	20.812	0.173	0.39	72	2	100	83	-0.080	8.99	0.06
121	20.986	0.174	0.39	72	0.39	100	84	-0.080	9.11	0.06
122	21.159	0.173	0.39	72	1.16	100	84	-0.070	9.16	0.06
123	21.333	0.174	0.40	72	1.06	100	84	-0.070	9.25	0.04
124	21.506	0.173	0.39	72	1.04	99	84	-0.080	9.18	0.07
125	21.679	0.173	0.39	72	0.29	99	84	-0.070	9.17	0.09
126	21.853	0.174	0.39	72	2.22	100	84	-0.070	9.14	0.08
127	22.026	0.173	0.39	72	1.1	99	83	-0.070	8.97	0.06

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 3

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/11/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
128	22.200	0.174	0.40	72	1.76	100	84	-0.060	7.84	0.13
129	22.373	0.173	0.39	72	1.04	99	84	-0.070	7.34	0.16
130	22.547	0.174	0.40	72	1.37	100	86	-0.070	7.24	0.15
131	22.720	0.173	0.41	72	0.24	99	87	-0.060	7.14	0.18
132	22.893	0.173	0.40	72	0.89	99	87	-0.070	6.92	0.19
133	23.067	0.174	0.41	72	2.24	99	88	-0.070	6.69	0.25
134	23.240	0.173	0.40	72	2.39	99	87	-0.070	6.56	0.24
135	23.414	0.174	0.40	72	0.63	99	87	-0.060	6.36	0.29
136	23.587	0.173	0.40	72	0.95	98	86	-0.060	6.29	0.32
137	23.761	0.174	0.41	72	2.34	99	86	-0.070	6.04	0.37
138	23.934	0.173	0.40	73	0.59	98	86	-0.060	5.88	0.40
139	24.108	0.174	0.40	73	2.44	99	86	-0.060	5.76	0.42
140	24.281	0.173	0.40	73	1.95	98	86	-0.060	5.64	0.39
141	24.454	0.173	0.40	73	0.87	98	86	-0.060	5.55	0.42
142	24.628	0.174	0.40	73	2.32	99	86	-0.060	5.54	0.42
143	24.801	0.173	0.40	73	2.41	98	86	-0.070	5.52	0.45
144	24.975	0.174	0.41	73	2.34	99	86	-0.060	5.43	0.46
145	25.148	0.173	0.40	73	2.38	98	86	-0.060	5.43	0.49
146	25.322	0.174	0.40	73	1.09	99	86	-0.070	5.41	0.49
147	25.495	0.173	0.40	73	1.32	98	86	-0.060	5.38	0.49
148	25.668	0.173	0.40	73	0.76	98	86	-0.060	5.57	0.46
149	25.842	0.174	0.40	73	2.12	98	86	-0.060	5.62	0.48
150	26.015	0.173	0.40	73	1.09	98	86	-0.060	5.58	0.51
151	26.189	0.174	0.40	73	1.17	98	86	-0.060	5.55	0.54
152	26.362	0.173	0.40	73	0.2	98	86	-0.060	5.62	0.56
153	26.536	0.174	0.41	73	1.37	99	85	-0.060	5.64	0.59
154	26.709	0.173	0.40	73	2.12	98	85	-0.060	5.57	0.56
155	26.883	0.174	0.40	73	1.82	99	85	-0.070	5.52	0.61
156	27.056	0.173	0.40	73	0.91	98	85	-0.070	5.69	0.56
157	27.229	0.173	0.41	73	0.57	98	85	-0.070	5.80	0.55
158	27.403	0.174	0.40	73	0.41	99	85	-0.070	5.92	0.44
159	27.576	0.173	0.41	73	1.01	98	85	-0.060	5.97	0.39

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 3

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/11/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
160	27.750	0.174	0.41	73	1.26	99	85	-0.060	6.06	0.35
161	27.923	0.173	0.40	73	2.17	98	85	-0.060	6.13	0.34
162	28.097	0.174	0.40	73	2.09	99	85	-0.070	6.32	0.30
163	28.270	0.173	0.40	73	0.85	98	85	-0.060	6.27	0.31
164	28.443	0.173	0.40	73	1.13	98	85	-0.060	6.31	0.31
165	28.617	0.174	0.40	73	0.92	98	85	-0.070	6.35	0.31
166	28.790	0.173	0.39	73	1.24	98	85	-0.070	6.14	0.37
167	28.964	0.174	0.40	73	2.37	98	86	-0.060	6.07	0.38
168	29.137	0.173	0.40	73	1.18	98	87	-0.060	5.91	0.38
169	29.311	0.174	0.39	73	0.8	98	87	-0.060	5.94	0.36
170	29.484	0.173	0.40	73	2.25	98	88	-0.070	6.04	0.35
171	29.657	0.173	0.40	73	2.47	98	89	-0.060	6.07	0.34
172	29.831	0.174	0.40	73	2.37	98	90	-0.060	6.04	0.33
173	30.004	0.173	0.40	73	2.18	98	90	-0.060	6.01	0.33
174	30.178	0.174	0.39	73	1.06	98	90	-0.060	5.96	0.31
175	30.351	0.173	0.40	73	1.07	98	90	-0.070	6.03	0.32
176	30.525	0.174	0.40	73	1.29	98	89	-0.060	5.98	0.30
177	30.698	0.173	0.40	73	1.54	98	88	-0.060	6.01	0.26
178	30.872	0.174	0.39	73	0.29	98	87	-0.060	6.00	0.29
179	31.045	0.173	0.40	73	2.37	98	87	-0.060	5.96	0.33
180	31.218	0.173	0.39	73	1.05	98	87	-0.060	5.95	0.31
181	31.392	0.174	0.40	73	2.45	98	86	-0.060	6.04	0.29
182	31.565	0.173	0.39	73	2.36	98	86	-0.060	5.86	0.34
183	31.739	0.174	0.39	73	0.58	98	86	-0.060	5.63	0.38
184	31.912	0.173	0.40	73	0.75	98	86	-0.060	5.53	0.39
185	32.086	0.174	0.39	73	2.43	98	86	-0.060	5.28	0.43
186	32.259	0.173	0.40	73	1.8	98	86	-0.060	5.20	0.41
Avg/Tot	32.259	0.173	0.40	69	1.40	100			7.93	0.28

WOODSTOVE SURFACE TEMPERATURE DATA

Client: IHP
Model: ST210GL
Run #: 3

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/11/2019

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
0	74	69	72	64	74	70.6	N/A
1	74	69	71	79	74	73.4	N/A
2	75	70	72	168	74	91.8	N/A
3	77	72	73	265	73	112.0	N/A
4	81	75	74	351	73	130.8	N/A
5	88	78	76	424	73	147.8	N/A
6	96	83	79	481	73	162.4	N/A
7	106	89	84	529	73	176.2	N/A
8	115	96	89	563	73	187.2	N/A
9	124	104	94	586	73	196.2	N/A
10	130	112	101	612	73	205.6	N/A
11	135	121	108	627	73	212.8	N/A
12	140	131	114	634	74	218.6	N/A
13	146	140	120	639	75	224.0	N/A
14	151	149	125	640	76	228.2	N/A
15	156	158	130	646	78	233.6	N/A
16	163	167	136	664	80	242.0	N/A
17	170	176	140	663	83	246.4	N/A
18	178	185	143	663	87	251.2	N/A
19	185	195	146	665	91	256.4	N/A
20	193	203	150	662	95	260.6	N/A
21	202	212	154	659	100	265.4	N/A
22	210	220	158	648	105	268.2	N/A
23	218	228	161	635	110	270.4	N/A
24	227	235	169	625	116	274.4	N/A
25	234	243	177	613	122	277.8	N/A
26	242	250	184	598	129	280.6	N/A
27	248	256	191	582	135	282.4	N/A
28	254	263	197	568	141	284.6	N/A
29	259	270	203	556	148	287.2	N/A
30	264	276	209	549	154	290.4	N/A
31	270	283	214	542	160	293.8	N/A
32	275	288	216	537	166	296.4	N/A
33	280	293	225	536	172	301.2	N/A
34	286	299	229	530	178	304.4	N/A
35	291	303	234	522	183	306.6	N/A
36	297	309	235	514	190	309.0	N/A
37	303	313	244	504	196	312.0	N/A
38	309	315	249	501	202	315.2	N/A
39	314	316	253	503	208	318.8	N/A
40	318	315	256	511	214	322.8	N/A
41	321	316	258	529	220	328.8	N/A
42	323	314	263	552	225	335.4	N/A
43	324	313	266	569	230	340.4	N/A
44	325	313	266	584	234	344.4	N/A
45	326	311	264	600	239	348.0	N/A
46	326	311	266	615	243	352.2	N/A
47	327	310	265	630	246	355.6	N/A

WOODSTOVE SURFACE TEMPERATURE DATA

Client: IHP
Model: ST210GL
Run #: 3

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/11/2019

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
48	327	310	267	644	249	359.4	N/A
49	327	310	268	658	252	363.0	N/A
50	328	309	270	669	254	366.0	N/A
51	329	310	270	681	256	369.2	N/A
52	330	310	269	693	258	372.0	N/A
53	331	311	267	701	260	374.0	N/A
54	332	311	272	709	261	377.0	N/A
55	334	312	272	716	262	379.2	N/A
56	335	313	270	722	263	380.6	N/A
57	337	314	272	727	265	383.0	N/A
58	339	314	271	733	265	384.4	N/A
59	341	317	272	740	267	387.4	N/A
60	344	317	275	746	267	389.8	N/A
61	347	319	276	752	268	392.4	N/A
62	350	321	277	756	269	394.6	N/A
63	353	323	273	760	270	395.8	N/A
64	357	325	275	761	271	397.8	N/A
65	360	328	276	763	273	400.0	N/A
66	364	330	276	765	274	401.8	N/A
67	368	332	275	767	275	403.4	N/A
68	372	335	278	771	276	406.4	N/A
69	376	338	281	777	277	409.8	N/A
70	380	341	277	784	278	412.0	N/A
71	384	343	280	790	280	415.4	N/A
72	388	346	281	795	281	418.2	N/A
73	392	349	283	800	283	421.4	N/A
74	396	353	290	803	284	425.2	N/A
75	401	357	291	810	286	429.0	N/A
76	405	360	291	819	287	432.4	N/A
77	409	364	294	828	289	436.8	N/A
78	413	367	291	838	291	440.0	N/A
79	418	371	296	846	292	444.6	N/A
80	422	375	297	854	294	448.4	N/A
81	427	379	300	860	296	452.4	N/A
82	432	383	301	864	298	455.6	N/A
83	436	385	301	867	300	457.8	N/A
84	441	389	307	870	302	461.8	N/A
85	446	392	303	870	304	463.0	N/A
86	450	396	308	872	306	466.4	N/A
87	455	400	310	870	309	468.8	N/A
88	460	402	319	869	311	472.2	N/A
89	464	405	316	865	313	472.6	N/A
90	469	408	317	860	316	474.0	N/A
91	473	411	319	853	318	474.8	N/A
92	477	414	321	847	321	476.0	N/A
93	482	416	320	841	324	476.6	N/A
94	486	419	327	836	326	478.8	N/A
95	489	422	330	833	329	480.6	N/A

WOODSTOVE SURFACE TEMPERATURE DATA

Client: IHP
Model: ST210GL
Run #: 3

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/11/2019

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
96	493	423	329	830	332	481.4	N/A
97	497	426	334	829	335	484.2	N/A
98	501	428	333	828	338	485.6	N/A
99	504	430	338	827	341	488.0	N/A
100	507	432	339	826	344	489.6	N/A
101	510	434	348	824	347	492.6	N/A
102	513	438	351	821	350	494.6	N/A
103	516	440	348	818	353	495.0	N/A
104	520	442	353	813	357	497.0	N/A
105	523	444	355	807	360	497.8	N/A
106	526	446	353	803	363	498.2	N/A
107	529	447	361	797	366	500.0	N/A
108	532	449	363	793	369	501.2	N/A
109	535	451	365	790	372	502.6	N/A
110	538	453	368	787	375	504.2	N/A
111	540	454	374	783	379	506.0	N/A
112	543	455	372	778	381	505.8	N/A
113	545	457	374	774	384	506.8	N/A
114	548	458	376	770	388	508.0	N/A
115	550	459	376	767	391	508.6	N/A
116	553	461	374	765	394	509.4	N/A
117	555	462	376	763	397	510.6	N/A
118	558	463	379	761	400	512.2	N/A
119	560	464	384	760	404	514.4	N/A
120	562	466	381	760	407	515.2	N/A
121	564	467	388	757	410	517.2	N/A
122	566	468	394	754	413	519.0	N/A
123	568	469	395	748	417	519.4	N/A
124	570	471	397	735	421	518.8	N/A
125	571	471	398	722	424	517.2	N/A
126	572	472	391	709	428	514.4	N/A
127	573	472	398	698	431	514.4	N/A
128	572	473	404	685	434	513.6	N/A
129	571	472	403	673	437	511.2	N/A
130	570	472	405	662	440	509.8	N/A
131	568	472	402	652	443	507.4	N/A
132	567	471	408	642	446	506.8	N/A
133	565	470	406	632	449	504.4	N/A
134	563	469	405	623	451	502.2	N/A
135	562	468	405	615	453	500.6	N/A
136	560	467	404	606	456	498.6	N/A
137	558	465	410	599	458	498.0	N/A
138	556	465	408	593	460	496.4	N/A
139	554	464	402	587	463	494.0	N/A
140	552	461	408	581	464	493.2	N/A
141	550	459	409	576	466	492.0	N/A
142	548	458	400	571	467	488.8	N/A
143	546	458	404	566	468	488.4	N/A

WOODSTOVE SURFACE TEMPERATURE DATA

Client: IHP
Model: ST210GL
Run #: 3

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/11/2019

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
144	544	456	403	562	470	487.0	N/A
145	542	455	401	559	471	485.6	N/A
146	540	454	402	556	471	484.6	N/A
147	538	453	401	553	472	483.4	N/A
148	536	451	401	552	473	482.6	N/A
149	534	450	398	550	473	481.0	N/A
150	533	450	396	549	474	480.4	N/A
151	531	449	394	549	475	479.6	N/A
152	529	450	395	549	475	479.6	N/A
153	527	448	393	549	476	478.6	N/A
154	525	447	395	550	477	478.8	N/A
155	523	448	392	552	478	478.6	N/A
156	522	449	393	555	479	479.6	N/A
157	520	448	395	559	480	480.4	N/A
158	518	447	391	563	481	480.0	N/A
159	517	448	389	566	482	480.4	N/A
160	515	448	388	572	483	481.2	N/A
161	514	448	388	575	484	481.8	N/A
162	513	448	390	574	486	482.2	N/A
163	512	450	391	573	487	482.6	N/A
164	510	451	394	573	488	483.2	N/A
165	510	451	390	572	490	482.6	N/A
166	509	452	391	573	491	483.2	N/A
167	508	452	389	571	492	482.4	N/A
168	507	452	392	571	494	483.2	N/A
169	506	454	390	571	495	483.2	N/A
170	505	453	380	572	497	481.4	N/A
171	504	454	389	573	498	483.6	N/A
172	504	455	389	574	500	484.4	N/A
173	503	455	389	576	502	485.0	N/A
174	503	455	386	574	503	484.2	N/A
175	502	455	387	565	505	482.8	N/A
176	502	455	390	556	507	482.0	N/A
177	502	455	388	549	509	480.6	N/A
178	501	454	389	542	510	479.2	N/A
179	501	453	385	536	512	477.4	N/A
180	501	453	385	531	513	476.6	N/A
181	501	452	388	526	514	476.2	N/A
182	500	451	387	522	515	475.0	N/A
183	500	450	388	519	517	474.8	N/A
184	499	450	388	515	518	474.0	N/A
185	498	449	387	512	518	472.8	N/A
186	498	448	383	508	519	471.2	N/A
Average	414	366	306	655	324	413	N/A

LAB SAMPLE DATA - ASTM E2515

Client: IHP
Job #: 19-468
Model: ST210GL
Tracking #: 0026
Run #: 3
Technician: SJB
Date: 4/11/2019

TRAIN A (1st Hour)

Sample Component	Sample Type	Filter, Probe, or O-Ring #	Weights		
			Final, mg	Tare, mg	Particulate, mg
A. Front filter catch	Filter	T197	93.5	88.4	5.1
B. Rear filter catch	Filter				0.0
C. Probe catch*	Probe				0.0
D. O-Ring catch*	O-Ring				0.0

Sub-Total	Total Particulate, mg:	5.1

TRAIN A (Post 1st hour)

Sample Component	Sample Type	Filter, Probe, or O-Ring #	Weights		
			Final, mg	Tare, mg	Particulate, mg
A. Front filter catch	Filter	T198	180.8	89.2	3.2
B. Rear filter catch	Filter	T199		88.4	
C. Probe catch*	Probe	13A	117455.7	117455.0	0.7
D. O-Ring catch*	O-Ring	13A	3445.6	3444.4	1.2

Sub-Total	Total Particulate, mg:	5.1
Train A Aggregate	Total Particulate, mg:	**10.2**

TRAIN B

Sample Component	Reagent	Filter, Probe, or O-Ring #	Weights		
			Final, mg	Tare, mg	Particulate, mg
A. Front filter catch	Filter	T200	185.1	89.0	7.7
B. Rear filter catch	Filter	T201		88.4	
C. Probe catch*	Probe	13B	117054.1	117053.6	0.5
D. O-Ring catch*	O-Ring	13B	3486.7	3485.5	1.2

Total Particulate, mg:	**9.4**

AMBIENT

Sample Component	Reagent	Filter, Probe, or O-Ring #	Weights		
			Final, mg	Tare, mg	Particulate, mg
A. Filter catch*	Filter				0.0

Total Particulate, mg:	**0.0**

*Particulate catch that results in a negative number, is assumed to be zero for probes and O-rings, negative numbers for filters are assumed to be part of the O-Ring weight.

ASTM E3053 Wood Heater Run Sheets

Client: IHP Job Number: 19-468 Tracking #: 0026
Model: ST210GL Run Number: 3 Test Date: 4/11/2019

Wood Heater Run Notes

Pre-Test Notes
Pre-Test Start Time: N/A
Air Control Setting: N/A

Time	Notes
N/A	N/A

Test Notes
Test Burn Start Time: 8:40
Air Control Setting: Fully Open

Time	Notes
0 min	8.2 lbs of kindling & start-up, lit with torch for 1 min then closed door.
35 min	Leveled coal bed, loaded test fuel, door closed within 1 min
60 min	Changed 1-hr filter
186 min	End of Test

Test Burn End Time: 11:46

Flue Gas Concentration Measurement

Calibration Gas Values: Span Gas CO_2 (%): 9.00 CO (%): 0.500
Mid Gas CO_2 (%): - CO (%): -

Calibration Results:

	Pre Test			Post Test		
	Zero	Mid	Span	Zero	Mid	Span
Time	8:26	-	8:29	4/12 – 8:00	-	4/12 – 8:05
CO_2	0.00	-	9.00	0.08	-	8.79
CO	0.00	-	0.500	0.004	-	0.486

Flue Gas Probe Leak Check: Initial: No Leakage Final: No Leakage

Technician Signature: Date: 4/15/2019

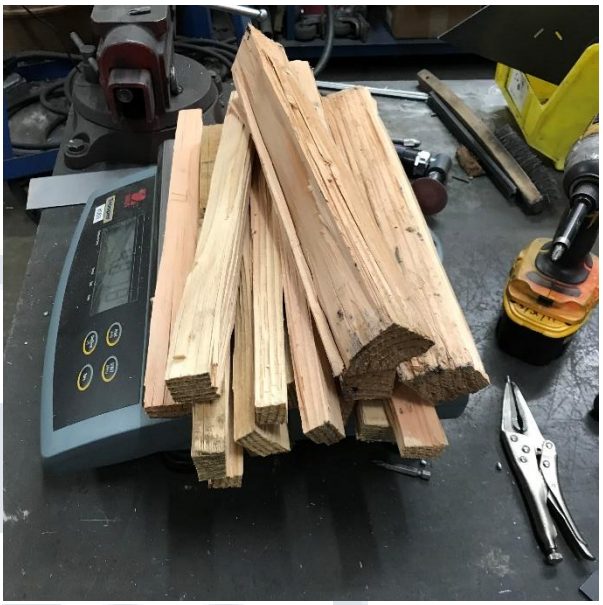
ASTM E3053 Wood Heater Run Sheets

Client: IHP | Job Number: 19-468 | Tracking #: 0026
Model: ST210GL | Run Number: 3 | Test Date: 4/11/2019

Test Photos



Kindling Fuel Load



Start-up Fuel Load



High Fire Fuel Load



Residual Start-up Fuel Coal Bed

Technician Signature: _____ Date: 4/15/2019

ASTM E3053 Wood Heater Run Sheets

Client: IHP Job Number: 19-468 Tracking #: 0026
Model: ST210GL Run Number: 3 Test Date: 4/11/2019



High Fire Fuel Loaded



Residual High Fire Load Coal Bed

N/A

Medium Fire Fuel Load

N/A

Medium Fire Fuel Loaded

Technician Signature: Date: 4/15/2019

WOOD STOVE TEST DATA PACKET
ASTM E3053/E2515

Run 4 Data Summary

Client: IHP
Model: ST210GL
Job #: 19-468
Tracking #: 0026
Test Date: 4/11/2019

4/25/2019

Techician Signature Date

TEST RESULTS - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 4

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/11/2019

Burn Rate (kg/hr):	0.87

	Ambient Sample	Sample Train A	Sample Train B	1st Hour Filter
Total Sample Volume (ft^3)	0.000	116.574	112.972	11.050
Average Gas Velocity in Dilution Tunnel (ft/sec)	16.55			
Average Gas Flow Rate in Dilution Tunnel (dscf/hr)	11111.0			
Average Gas Meter Temperature (°F)	70.6	77.8	74.7	75.0
Total Sample Volume (dscf)	0.000	111.905	111.083	10.663
Average Tunnel Temperature (°F)	79.6			
Total Time of Test (min)	633			
Total Particulate Catch (mg)	0.0	15.2	16.7	4.6
Particulate Concentration, dry-standard (g/dscf)	0.0000000	0.0001358	0.0001503	0.0004314
Total PM Emissions (g)	0.00	15.92	17.62	4.79
Particulate Emission Rate (g/hr)	0.00	1.51	1.67	4.79
Emissions Factor (g/kg)	-	1.72	1.91	-
Difference from Average Total Particulate Emissions (g)	-	0.85	0.85	-
Difference from Average Emissions Factor (g/kg)	-	0.09	0.09	-

Final Average Results	
Total Particulate Emissions (g)	16.77
Particulate Emission Rate (g/hr)	1.59
Emissions Factor (g/kg)	1.82
HHV Efficiency (%)	71.3%
LHV Efficiency (%)	76.3%
CO Emissions (g/min)	1.49

Quality Checks	Requirement	Observed	Result
Dual Train Precision	Each train within 7.5% of average emissions (in grams), or emission factors within 0.5 g/kg	See Above	OK
Filter Temps	>80 °F, <90 °F	Min: 81 / Max: 89	OK
Face Velocity	< 30 ft/min	9.9	OK
Leakage Rate	Less than 4% of average sample rate	0.002 cfm	OK
Ambient Temp	55-90 °F	Min: 66 / Max: 79	OK
Negative Probe Weight Evaluation	<5% of Total Catch	Probe Catch Not Negative	OK
Pro-Rate Variation	90% of readings between 90-110%; none greater than 120% or less than 80%	See Data Tabs	OK

B415.1 Efficiency Results

Manufacturer:	IHP
Model:	ST210GL
Date:	04/11/19
Run:	4
Control #:	19-468
Test Duration:	633
Output Category:	Medium

Test Results in Accordance with CSA B415.1-09

	HHV Basis	LHV Basis
Overall Efficiency	71.3%	76.3%
Combustion Efficiency	93.6%	93.6%
Heat Transfer Efficiency	76.2%	81.5%

Output Rate (kJ/h)	12,458	11,817	**(Btu/h)**
Burn Rate (kg/h)	0.87	1.93	**(lb/h)**
Input (kJ/h)	17,464	16,567	**(Btu/h)**

Test Load Weight (dry kg)	9.23	20.34	**dry lb**
MC wet (%)	16.62		
MC dry (%)	19.93		
Particulate (g)	16.77		
CO (g)	944		
Test Duration (h)	10.55		

Emissions	**Particulate**	**CO**
g/MJ Output	0.13	7.18
g/kg Dry Fuel	1.82	102.27
g/h	1.59	89.48
g/min	0.03	1.49
lb/MM Btu Output	0.30	16.69

Air/Fuel Ratio (A/F)	24.72

VERSION: **2.2** **12/14/2009**

HIGH FIRE FUEL LOAD DATA - ASTM E3053

Client: IHP
Job #: 19-468
Model: ST210GL
Tracking #: 0026
Run #: 4
Technician: SJB
Date: 4/11/2019

Nominal Loading Density (lbs/ft^3, wet basis):	10		
Usable Firebox Volume (ft^3):	2.12		
Target Load Weight (lbs):	21.20		
Total Load Weight Range (lbs):	20.10	to	22.30
Core Load Weight Range (lbs):	9.50	to	13.80
Remainder Load Weight Range (lbs):	7.40	to	11.70
Core Load Piece Range (lbs):	3.20	to	5.30
Remainder Load Piece Range (lbs):	2.10	to	11.70
Max Allowable Kindling Weight (lbs):	4.35		
Max Allowable Start-up Fuel Weight (lbs):	6.52		

CORE LOAD DATA

				Fuel Piece Moisture Readings (%DB)					Dry Weight	
Piece #	Length (in)	Weight (lbs)	Within Spec?	1	2	3	Ave.	Within Spec?	lbs	kg
1	15.00	5.25	In Range	17.6	18.7	19.7	18.7	In Range	4.42	2.01
2	15.00	3.40	In Range	19.8	19.4	18.8	19.3	In Range	2.85	1.29
3	15.00	4.88	In Range	18.0	17.8	19.1	18.3	In Range	4.13	1.87
Core Load Wt. (lbs)		13.53	In Range							

REMAINDER LOAD DATA (1 to 3 Pieces)

				Fuel Piece Moisture Readings (%DB)					Dry Weight	
Piece #	Length (in)	Weight (lbs)	Within Spec?	1	2	3	Ave.	Within Spec?	lbs	kg
1	15.00	3.05	In Range	23.2	23.9	18.6	21.9	In Range	2.50	1.13
2	15.00	5.15	In Range	19.8	18.3	17.5	18.5	In Range	4.34	1.97
3	15.00		NA				NA	NA	NA	NA
Remainder Load (lbs)		8.20	In Range							

Total Load Weight (lbs):	21.73	In Range	
Core Load % of Total Weight:	62%	In Range	45-65%
Remainder % of Total Weight:	38%	In Range	35-55%
Total Load % of Target Weight:	103%	In Range	95-105%
Actual Fuel Loading Density (lb/ft3):	10.3		
Total Load Average Moisture Conent (%DB):	19.1	In Range	19-25%
Total Load Average Moisture Conent (%WB):	16.0		
Total Test Load Weight (dry basis):	18.25 lbs	8.28 kg	

KINDLING AND START-UP FUEL

		Kindling Moisture Readings (%DB)					Dry Weight	
Kindling Weight (lbs)	Within Spec?	1	2	3	Avg.	Within Spec?	lbs	kg
3.29	In Range	10	10	10	10.0	In Range	2.99	1.36

		Start-up Moisture Readings (%DB)					Dry Weight	
Start-up Fuel Wt. (lb)	Within Spec?	1	2	3	Avg.	Within Spec?	lbs	kg
4.88	In Range	24.2	22.3	23.7	23.4	In Range	3.95	1.79

TEST FUEL LOADING RANGE

Allowable Residual Start-up Fuel Range (lb):	2.2	to	4.3	
Actual Residual Start-up Fuel Weight (lb):		2.2		In Range

LOW & MEDIUM FIRE FUEL LOAD DATA - ASTM E3053

Client: IHP
Job #: 19-468
Model: ST210GL
Tracking #: 0026
Run #: 4
Technician: SJB
Date: 4/11/2019

Nominal Loading Density (lbs/ft^3, wet basis):	12		
Usable Firebox Volume (ft^3):	2.12		
Target Load Weight (lbs):	25.44		
Total Load Weight Range (lbs):	24.17	to	26.71
Core Load Weight Range (lbs):	11.45	to	16.54
Remainder Load Weight Range (lbs):	8.90	to	13.99
Core Load Piece Range (lbs):	3.82	to	6.36
Remainder Load Piece Range (lbs):	2.54	to	7.63

CORE LOAD DATA

				Fuel Piece Moisture Readings (%DB)					Dry Weight	
Piece #	Length (in)	Weight (lbs)	Within Spec?	1	2	3	Ave.	Within Spec?	lbs	kg
1	15.00	4.27	In Range	21.0	17.6	18.3	19.0	In Range	3.59	1.63
2	15.00	4.60	In Range	18.3	19.2	17.6	18.4	In Range	3.89	1.76
3	15.00	4.08	In Range	20.4	23.6	22.9	22.3	In Range	3.34	1.51
Core Load Wt. (lbs)		12.95	In Range							

REMAINDER LOAD DATA (2 to 3 Pieces)

				Fuel Piece Moisture Readings (%DB)					Dry Weight	
Piece #	Length (in)	Weight (lbs)	Within Spec?	1	2	3	Ave.	Within Spec?	lbs	kg
1	15.00	4.68	In Range	20.2	22.7	24.2	22.4	In Range	3.82	1.73
2	15.00	3.10	In Range	19.7	17.2	18.6	18.5	In Range	2.62	1.19
3	15.00	3.64	In Range	17.6	20.0	18.4	18.7	In Range	3.07	1.39
Remainder Load (lbs)		11.42	In Range							

Remainder Load Small/Large Piece Weight Ratio:	66%	In Range	≤ 67%
Total Load Weight (lbs):	24.37	In Range	
Core Load % of Total Weight:	53%	In Range	45-65%
Remainder % of Total Weight:	47%	In Range	35-55%
Total Load % of Target Weight:	96%	In Range	95-105%
Actual Fuel Loading Density (lb/ft3):	11.5		
Total Load Average Moisture Conent (%DB):	19.9	In Range	19-25%
Total Load Average Moisture Conent (%WB):	16.6		
Total Test Load Weight (dry basis):	20.32 lbs	9.22 kg	

TEST FUEL LOADING RANGE

Allowable Charcoal Bed Weight Range (lb):	2.5	to 4.8	
Actual Charcoal Bed Wt. (lb):	2.6	In Range	

TEST END POINT

Actual Fuel Load Ending Weight (lb): 0.0 Valid Test (≥90%)

Total Fuel Burned During Test Run:
24.4 lbs, wet basis
20.3 lbs, dry basis
9.22 kg, dry basis

DILUTION TUNNEL & MISC. DATA - ASTM E3053 / E2515

Client:	IHP	Job #:	19-468
Model:	ST210GL	Tracking #:	0026
Run #:	4	Technician:	SJB
Test Start Time:	12:30	Date:	4/11/2019
Test Type:	Medium Fire		

Recording Interval (min):	1
Total Sampling Time (min):	633

	Pre-Test	Post Test	Avg.
Barometric Pressure (in. Hg)	29.69	29.62	29.66
Relative Humidity (%)	28.4	24.7	
Room Air Velocity (ft/min)	0	0	
Scale Audit (lbs)	10.0	10.0	

Meter Box γ Factor:	0.986	(A)	
Meter Box γ Factor:	1.004	(B)	
Meter Box γ Factor:	1.000	(Ambient)	
Ambient Sample Volume:	0.000	ft^3	

Induced Draft Check (in. H_2O):	0
Smoke Capture Check (%):	100%
Date Flue Pipe Last Cleaned:	4/10/2019

Sample Train Post-Test Leak Checks

(A)	0.000	cfm @	-14	in. Hg
(B)	0.002	cfm @	-10	in. Hg
(Ambient)	0.000	cfm @	0	in. Hg

DILUTION TUNNEL FLOW

Traverse Data

Point	dP (in H_2O)	Temp (°F)
1	0.060	60
2	0.068	60
3	0.058	60
4	0.060	60
5	0.052	60
6	0.070	60
7	0.060	60
8	0.048	60
Center	0.070	60

Static Pressure: -0.300 in. H_2O

Dilution Tunnel H_2O:	2.00	percent
Tunnel Diameter:	6	inches
Pitot Tube Cp:	0.99	[unitless]
Dilution Tunnel MW(dry):	29.00	lb/lb-mole
Dilution Tunnel MW(wet):	28.78	lb/lb-mole
Tunnel Area:	0.1963	ft^2
V_{strav}:	16.24	ft/sec
V_{scent}:	17.47	ft/sec
F_p:	0.929	[ratio]
Initial Tunnel Flow:	186.9	scf/min

TEST FUEL PROPERTIES

ASTM 3053-17 - Table A1.1 Fuel Properties by Fuel Species

Select Fuel Type	Species	%C	%H	%O	%Ash	MJ/kg	BTU/lb
	Ash, White	49.70	6.90	43.00	0.30	20.75	8927
	Beech	48.70	5.80	44.70	0.60	18.80	8088
	Birch, Sweet	49.80	6.50	43.40	0.30	20.12	8656
	Birch, Yellow	49.80	6.50	43.40	0.30	20.12	8656
	Doug Fir (Coast, Interior West/North)	48.73	6.87	43.90	0.50	19.81	8522
	Doug Fir (Interioir South)	48.73	6.87	43.90	0.50	19.81	8522
	Elm, Rock	50.40	6.60	42.30	0.70	20.49	8815
	Elm, Soft	50.40	6.60	42.30	0.70	20.49	8815
	Gum, Red	50.88	6.06	41.57	1.28	19.72	8478
	Larch, Western	50.54	6.36	42.40	0.70	17.58	7558
X	Maple, Hard	50.64	6.02	41.74	1.35	19.96	8587
	Maple, Sugar	50.64	6.02	41.74	1.35	19.96	8587
	Oak, Red	49.50	6.62	43.70	0.20	20.20	8690
	Oak, White	50.40	6.59	42.70	0.20	20.50	8819
	Pine, Southern	52.60	7.00	40.10	1.31	22.30	9587
	Pine, Southern Long Leaf	52.60	7.02	40.10	1.30	22.30	9594
	Other						

WOODSTOVE PREBURN DATA

Client: IHP
Model: ST210GL
Run #: 4

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/11/2019

Recording Interval (min): 1
Run Time (min): 186

			Temperatures (°F)							
Elapsed Time (min)	**Scale Reading (lbs)**	**Flue Draft (in H_2O)**	**FB Left**	**FB Right**	**FB Back**	**FB Top**	**FB Bottom**	**Stove Surface Average**	**Flue**	**Ambient**
0	8.2	0.000	74	69	72	64	74	70.6	62	58
1	7.9	-0.030	74	69	71	79	74	73.4	157	58
2	7.8	-0.050	75	70	72	168	74	91.8	238	58
3	7.5	-0.070	77	72	73	265	73	112.0	347	59
4	7.3	-0.080	81	75	74	351	73	130.8	432	59
5	7.0	-0.080	88	78	76	424	73	147.8	482	60
6	6.8	-0.090	96	83	79	481	73	162.4	516	61
7	6.7	-0.080	106	89	84	529	73	176.2	530	61
8	6.4	-0.080	115	96	89	563	73	187.2	533	62
9	6.2	-0.080	124	104	94	586	73	196.2	521	63
10	5.8	-0.080	130	112	101	612	73	205.6	529	63
11	5.6	-0.080	135	121	108	627	73	212.8	523	63
12	5.4	-0.070	140	131	114	634	74	218.6	514	64
13	5.1	-0.080	146	140	120	639	75	224.0	515	64
14	4.9	-0.080	151	149	125	640	76	228.2	506	64
15	4.6	-0.080	156	158	130	646	78	233.6	514	64
16	4.5	-0.080	163	167	136	664	80	242.0	525	65
17	4.3	-0.080	170	176	140	663	83	246.4	506	65
18	4.0	-0.080	178	185	143	663	87	251.2	502	65
19	4.1	-0.080	185	195	146	665	91	256.4	495	66
20	3.9	-0.080	193	203	150	662	95	260.6	481	65
21	3.4	-0.080	202	212	154	659	100	265.4	471	65
22	3.5	-0.070	210	220	158	648	105	268.2	451	65
23	3.4	-0.070	218	228	161	635	110	270.4	438	66
24	3.2	-0.060	227	235	169	625	116	274.4	423	66
25	3.2	-0.070	234	243	177	613	122	277.8	404	66
26	3.3	-0.070	242	250	184	598	129	280.6	385	67
27	2.8	-0.060	248	256	191	582	135	282.4	374	66
28	2.8	-0.070	254	263	197	568	141	284.6	366	66
29	2.8	-0.070	259	270	203	556	148	287.2	363	65
30	2.7	-0.060	264	276	209	549	154	290.4	366	66
31	2.5	-0.060	270	283	214	542	160	293.8	359	66
32	2.5	-0.070	275	288	216	537	166	296.4	357	66
33	2.4	-0.060	280	293	225	536	172	301.2	358	66
34	2.3	-0.060	286	299	229	530	178	304.4	351	66
35	2.1	-0.060	291	303	234	522	183	306.6	346	66
36	23.8	-0.040	297	309	235	514	190	309.0	423	68
37	23.6	-0.060	303	313	244	504	196	312.0	364	67
38	23.3	-0.060	309	315	249	501	202	315.2	352	67
39	23.3	-0.070	314	316	253	503	208	318.8	355	66
40	23.2	-0.060	318	315	256	511	214	322.8	374	67
41	23.0	-0.070	321	316	258	529	220	328.8	401	67
42	22.7	-0.070	323	314	263	552	225	335.4	415	67
43	22.8	-0.070	324	313	266	569	230	340.4	419	67

WOODSTOVE PREBURN DATA

Client: IHP
Model: ST210GL
Run #: 4

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/11/2019

Recording Interval (min): 1
Run Time (min): 186

			Temperatures (°F)							
Elapsed Time (min)	**Scale Reading (lbs)**	**Flue Draft (in H_2O)**	**FB Left**	**FB Right**	**FB Back**	**FB Top**	**FB Bottom**	**Stove Surface Average**	**Flue**	**Ambient**
44	22.6	-0.070	325	313	266	584	234	344.4	428	67
45	22.5	-0.070	326	311	264	600	239	348.0	440	67
46	22.3	-0.080	326	311	266	615	243	352.2	445	67
47	22.1	-0.080	327	310	265	630	246	355.6	452	67
48	21.9	-0.080	327	310	267	644	249	359.4	459	68
49	21.8	-0.080	327	310	268	658	252	363.0	463	68
50	21.7	-0.070	328	309	270	669	254	366.0	468	68
51	21.5	-0.080	329	310	270	681	256	369.2	474	68
52	21.3	-0.080	330	310	269	693	258	372.0	484	69
53	21.0	-0.070	331	311	267	701	260	374.0	492	68
54	20.9	-0.080	332	311	272	709	261	377.0	496	68
55	20.8	-0.080	334	312	272	716	262	379.2	502	68
56	20.4	-0.080	335	313	270	722	263	380.6	503	68
57	20.2	-0.070	337	314	272	727	265	383.0	507	68
58	20.1	-0.080	339	314	271	733	265	384.4	509	68
59	19.9	-0.080	341	317	272	740	267	387.4	514	69
60	19.8	-0.080	344	317	275	746	267	389.8	519	70
61	19.6	-0.080	347	319	276	752	268	392.4	524	69
62	19.4	-0.080	350	321	277	756	269	394.6	529	70
63	19.2	-0.070	353	323	273	760	270	395.8	532	70
64	18.8	-0.090	357	325	275	761	271	397.8	536	69
65	18.7	-0.080	360	328	276	763	273	400.0	539	70
66	18.5	-0.080	364	330	276	765	274	401.8	542	70
67	18.3	-0.080	368	332	275	767	275	403.4	545	71
68	18.1	-0.080	372	335	278	771	276	406.4	548	71
69	17.8	-0.080	376	338	281	777	277	409.8	549	72
70	17.7	-0.080	380	341	277	784	278	412.0	551	72
71	17.4	-0.080	384	343	280	790	280	415.4	551	72
72	18.0	-0.080	388	346	281	795	281	418.2	555	72
73	17.0	-0.080	392	349	283	800	283	421.4	553	72
74	17.1	-0.080	396	353	290	803	284	425.2	549	72
75	16.7	-0.080	401	357	291	810	286	429.0	553	71
76	16.4	-0.080	405	360	291	819	287	432.4	555	72
77	16.3	-0.090	409	364	294	828	289	436.8	558	73
78	15.9	-0.080	413	367	291	838	291	440.0	562	74
79	16.7	-0.080	418	371	296	846	292	444.6	562	73
80	16.1	-0.080	422	375	297	854	294	448.4	565	74
81	15.6	-0.080	427	379	300	860	296	452.4	566	75
82	15.5	-0.080	432	383	301	864	298	455.6	569	73
83	15.0	-0.080	436	385	301	867	300	457.8	567	74
84	15.2	-0.090	441	389	307	870	302	461.8	568	75
85	14.6	-0.080	446	392	303	870	304	463.0	570	74
86	14.3	-0.080	450	396	308	872	306	466.4	565	74
87	14.1	-0.080	455	400	310	870	309	468.8	561	74

WOODSTOVE PREBURN DATA

Client: IHP
Model: ST210GL
Run #: 4

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/11/2019

Recording Interval (min): 1
Run Time (min): 186

			Temperatures (°F)							
Elapsed Time (min)	**Scale Reading (lbs)**	**Flue Draft (in H_2O)**	**FB Left**	**FB Right**	**FB Back**	**FB Top**	**FB Bottom**	**Stove Surface Average**	**Flue**	**Ambient**
88	14.0	-0.080	460	402	319	869	311	472.2	558	75
89	13.9	-0.080	464	405	316	865	313	472.6	554	74
90	13.7	-0.090	469	408	317	860	316	474.0	550	75
91	13.4	-0.080	473	411	319	853	318	474.8	544	75
92	13.3	-0.080	477	414	321	847	321	476.0	543	75
93	13.2	-0.090	482	416	320	841	324	476.6	538	76
94	13.0	-0.080	486	419	327	836	326	478.8	536	75
95	12.7	-0.090	489	422	330	833	329	480.6	534	75
96	12.5	-0.070	493	423	329	830	332	481.4	532	75
97	12.2	-0.080	497	426	334	829	335	484.2	532	76
98	12.3	-0.080	501	428	333	828	338	485.6	531	75
99	12.1	-0.080	504	430	338	827	341	488.0	529	76
100	11.8	-0.080	507	432	339	826	344	489.6	527	76
101	11.7	-0.080	510	434	348	824	347	492.6	525	76
102	11.7	-0.080	513	438	351	821	350	494.6	525	76
103	11.5	-0.080	516	440	348	818	353	495.0	523	77
104	11.3	-0.080	520	442	353	813	357	497.0	518	76
105	10.6	-0.070	523	444	355	807	360	497.8	515	75
106	11.1	-0.080	526	446	353	803	363	498.2	511	77
107	10.8	-0.070	529	447	361	797	366	500.0	505	76
108	10.6	-0.080	532	449	363	793	369	501.2	502	75
109	10.6	-0.080	535	451	365	790	372	502.6	503	76
110	10.7	-0.070	538	453	368	787	375	504.2	500	76
111	10.3	-0.070	540	454	374	783	379	506.0	497	76
112	9.9	-0.080	543	455	372	778	381	505.8	491	76
113	10.0	-0.080	545	457	374	774	384	506.8	489	75
114	9.8	-0.070	548	458	376	770	388	508.0	485	76
115	9.5	-0.080	550	459	376	767	391	508.6	486	78
116	9.8	-0.070	553	461	374	765	394	509.4	485	76
117	9.5	-0.070	555	462	376	763	397	510.6	488	76
118	8.7	-0.070	558	463	379	761	400	512.2	486	75
119	9.1	-0.080	560	464	384	760	404	514.4	485	76
120	9.1	-0.080	562	466	381	760	407	515.2	486	76
121	9.0	-0.080	564	467	388	757	410	517.2	485	76
122	8.9	-0.070	566	468	394	754	413	519.0	482	76
123	8.8	-0.070	568	469	395	748	417	519.4	475	75
124	8.6	-0.080	570	471	397	735	421	518.8	460	76
125	8.6	-0.070	571	471	398	722	424	517.2	452	77
126	8.5	-0.070	572	472	391	709	428	514.4	446	77
127	8.5	-0.070	573	472	398	698	431	514.4	440	75
128	8.5	-0.060	572	473	404	685	434	513.6	432	76
129	8.1	-0.070	571	472	403	673	437	511.2	426	76
130	8.0	-0.070	570	472	405	662	440	509.8	419	75
131	8.1	-0.060	568	472	402	652	443	507.4	414	75

WOODSTOVE PREBURN DATA

Client: IHP
Model: ST210GL
Run #: 4

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/11/2019

Recording Interval (min): 1
Run Time (min): 186

			Temperatures (°F)							
Elapsed Time (min)	**Scale Reading (lbs)**	**Flue Draft (in H_2O)**	**FB Left**	**FB Right**	**FB Back**	**FB Top**	**FB Bottom**	**Stove Surface Average**	**Flue**	**Ambient**
132	8.0	-0.070	567	471	408	642	446	506.8	408	75
133	8.5	-0.070	565	470	406	632	449	504.4	402	75
134	7.8	-0.070	563	469	405	623	451	502.2	397	75
135	7.8	-0.060	562	468	405	615	453	500.6	392	75
136	7.8	-0.060	560	467	404	606	456	498.6	389	74
137	7.6	-0.070	558	465	410	599	458	498.0	385	74
138	8.0	-0.060	556	465	408	593	460	496.4	383	73
139	7.6	-0.060	554	464	402	587	463	494.0	379	74
140	7.3	-0.060	552	461	408	581	464	493.2	378	73
141	7.3	-0.060	550	459	409	576	466	492.0	374	73
142	7.6	-0.060	548	458	400	571	467	488.8	373	73
143	7.2	-0.070	546	458	404	566	468	488.4	371	74
144	7.2	-0.060	544	456	403	562	470	487.0	371	73
145	7.0	-0.060	542	455	401	559	471	485.6	369	73
146	7.0	-0.070	540	454	402	556	471	484.6	368	73
147	6.9	-0.060	538	453	401	553	472	483.4	368	72
148	7.0	-0.060	536	451	401	552	473	482.6	367	73
149	6.8	-0.060	534	450	398	550	473	481.0	366	73
150	7.0	-0.060	533	450	396	549	474	480.4	365	73
151	6.8	-0.060	531	449	394	549	475	479.6	365	73
152	6.8	-0.060	529	450	395	549	475	479.6	367	74
153	6.6	-0.060	527	448	393	549	476	478.6	372	73
154	6.6	-0.060	525	447	395	550	477	478.8	377	73
155	6.5	-0.070	523	448	392	552	478	478.6	380	73
156	6.4	-0.070	522	449	393	555	479	479.6	384	72
157	6.3	-0.070	520	448	395	559	480	480.4	389	72
158	6.2	-0.070	518	447	391	563	481	480.0	387	73
159	6.1	-0.060	517	448	389	566	482	480.4	385	73
160	6.1	-0.060	515	448	388	572	483	481.2	382	72
161	6.1	-0.060	514	448	388	575	484	481.8	377	72
162	6.3	-0.070	513	448	390	574	486	482.2	375	72
163	5.9	-0.060	512	450	391	573	487	482.6	375	72
164	5.9	-0.060	510	451	394	573	488	483.2	373	72
165	5.8	-0.070	510	451	390	572	490	482.6	374	72
166	5.6	-0.070	509	452	391	573	491	483.2	374	72
167	5.4	-0.060	508	452	389	571	492	482.4	374	72
168	5.6	-0.060	507	452	392	571	494	483.2	375	72
169	5.5	-0.060	506	454	390	571	495	483.2	374	72
170	5.4	-0.070	505	453	380	572	497	481.4	375	71
171	5.4	-0.060	504	454	389	573	498	483.6	375	73
172	5.4	-0.060	504	455	389	574	500	484.4	375	73
173	5.2	-0.060	503	455	389	576	502	485.0	375	72
174	5.2	-0.060	503	455	386	574	503	484.2	373	72
175	5.1	-0.070	502	455	387	565	505	482.8	366	72

WOODSTOVE PREBURN DATA

Client: IHP
Model: ST210GL
Run #: 4

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/11/2019

Recording Interval (min): 1
Run Time (min): 186

			Temperatures (°F)							
Elapsed Time (min)	**Scale Reading (lbs)**	**Flue Draft (in H_2O)**	**FB Left**	**FB Right**	**FB Back**	**FB Top**	**FB Bottom**	**Stove Surface Average**	**Flue**	**Ambient**
176	5.1	-0.060	502	455	390	556	507	482.0	361	72
177	4.8	-0.060	502	455	388	549	509	480.6	356	72
178	4.9	-0.060	501	454	389	542	510	479.2	352	72
179	4.9	-0.060	501	453	385	536	512	477.4	349	72
180	4.9	-0.060	501	453	385	531	513	476.6	347	72
181	4.8	-0.060	501	452	388	526	514	476.2	346	72
182	4.8	-0.060	500	451	387	522	515	475.0	346	72
183	4.7	-0.060	500	450	388	519	517	474.8	346	72
184	4.7	-0.060	499	450	388	515	518	474.0	344	71
185	4.7	-0.060	498	449	387	512	518	472.8	344	72
186	4.7	-0.060	498	448	383	508	519	471.2	342	71

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 4

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/11/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
0	0.000		0.070	0.00	74	-0.73		24.4		111	330	87	71
1	0.184	0.184	0.070	0.39	74	0.21	104	24.4	0	112	273	85	72
2	0.368	0.184	0.070	0.39	74	-0.69	103	24.3	-0.1	100	267	85	71
3	0.552	0.184	0.070	0.39	74	0.41	102	24.2	-0.1	99	289	85	70
4	0.737	0.185	0.070	0.38	74	-0.1	103	24.0	-0.2	101	338	86	71
5	0.921	0.184	0.070	0.38	74	-0.04	103	23.9	-0.1	105	395	86	71
6	1.105	0.184	0.070	0.38	74	0.51	103	23.7	-0.2	110	444	87	71
7	1.289	0.184	0.070	0.37	74	-0.12	104	23.5	-0.2	115	486	88	71
8	1.473	0.184	0.070	0.39	74	0.26	104	23.1	-0.4	120	522	88	72
9	1.657	0.184	0.070	0.39	74	0.57	105	22.8	-0.3	126	564	89	73
10	1.842	0.185	0.070	0.38	74	-0.22	106	22.4	-0.4	132	598	89	73
11	2.026	0.184	0.070	0.39	74	0.81	106	22.3	-0.1	136	616	88	74
12	2.210	0.184	0.070	0.38	74	2.13	106	21.9	-0.4	142	630	88	75
13	2.394	0.184	0.070	0.36	74	2.61	107	22.0	0.1	145	632	87	76
14	2.578	0.184	0.070	0.51	74	0.43	107	21.1	-0.9	147	640	83	75
15	2.762	0.184	0.070	0.38	74	-0.3	107	21.0	-0.1	150	639	86	76
16	2.947	0.185	0.070	0.38	74	0.25	107	21.1	0.1	139	559	86	77
17	3.131	0.184	0.070	0.38	74	0.1	105	20.6	-0.5	131	519	85	77
18	3.315	0.184	0.070	0.38	74	-0.24	105	20.2	-0.4	127	497	85	75
19	3.499	0.184	0.070	0.39	74	-0.05	105	20.2	0	124	485	84	75
20	3.683	0.184	0.070	0.38	74	-0.45	104	19.7	-0.5	121	479	84	76
21	3.867	0.184	0.070	0.38	74	-0.42	104	19.8	0.1	120	476	85	76
22	4.052	0.185	0.070	0.38	74	-0.41	105	19.6	-0.2	120	471	85	75
23	4.236	0.184	0.070	0.39	74	-0.17	104	19.3	-0.3	119	470	86	76
24	4.420	0.184	0.070	0.39	74	-0.51	104	19.1	-0.2	118	466	86	76
25	4.604	0.184	0.070	0.39	74	0.68	104	19.0	-0.1	118	460	86	76
26	4.788	0.184	0.070	0.40	74	0.37	104	18.8	-0.2	117	458	86	76
27	4.972	0.184	0.070	0.39	74	0.74	104	18.5	-0.3	117	459	86	77
28	5.157	0.185	0.070	0.40	75	0.16	104	18.5	0	117	463	86	76
29	5.341	0.184	0.070	0.40	75	0.11	104	18.2	-0.3	116	463	86	77
30	5.525	0.184	0.070	0.40	75	-0.45	104	18.0	-0.2	116	463	86	76
31	5.709	0.184	0.070	0.40	75	0.77	104	18.4	0.4	116	464	86	76
32	5.893	0.184	0.070	0.40	75	0.61	104	17.7	-0.7	116	463	86	77

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 4

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/11/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
33	6.077	0.184	0.070	0.40	75	-0.2	104	17.7	0	117	462	86	76
34	6.261	0.184	0.070	0.39	75	-0.16	104	17.4	-0.3	116	460	86	76
35	6.446	0.185	0.070	0.39	75	-0.05	104	17.2	-0.2	115	457	86	76
36	6.630	0.184	0.070	0.40	75	0.66	104	16.9	-0.3	115	454	86	76
37	6.814	0.184	0.070	0.40	75	0.7	104	16.8	-0.1	115	452	86	77
38	6.998	0.184	0.070	0.39	75	0.28	104	16.6	-0.2	115	450	86	77
39	7.182	0.184	0.070	0.39	75	-0.04	104	16.2	-0.4	115	448	86	76
40	7.366	0.184	0.070	0.40	76	-0.37	103	16.2	0	115	448	86	77
41	7.551	0.185	0.070	0.40	76	0.77	104	16.0	-0.2	115	448	86	77
42	7.735	0.184	0.070	0.39	76	-0.43	103	16.0	0	114	449	86	78
43	7.919	0.184	0.070	0.40	76	0.21	103	15.7	-0.3	114	447	86	77
44	8.103	0.184	0.070	0.39	76	0.04	103	15.4	-0.3	113	447	86	78
45	8.287	0.184	0.070	0.39	76	-0.24	103	15.4	0	113	446	86	78
46	8.471	0.184	0.070	0.39	76	-0.49	103	15.0	-0.4	113	445	86	77
47	8.656	0.185	0.070	0.39	76	0.8	104	15.1	0.1	113	446	86	77
48	8.840	0.184	0.070	0.39	76	0.85	103	14.9	-0.2	113	445	86	78
49	9.024	0.184	0.070	0.39	76	0	103	14.7	-0.2	113	441	86	77
50	9.208	0.184	0.070	0.39	76	0.1	103	14.6	-0.1	113	441	86	77
51	9.392	0.184	0.070	0.39	76	0.28	103	14.4	-0.2	113	441	86	77
52	9.576	0.184	0.070	0.39	77	0.78	103	14.2	-0.2	113	442	86	78
53	9.761	0.185	0.070	0.39	77	0.63	104	14.0	-0.2	112	439	86	77
54	9.945	0.184	0.070	0.39	77	0.87	103	13.9	-0.1	112	437	86	78
55	10.129	0.184	0.070	0.39	77	-0.17	103	13.5	-0.4	112	435	86	78
56	10.313	0.184	0.070	0.39	77	-0.09	103	13.4	-0.1	112	433	86	79
57	10.497	0.184	0.070	0.39	77	-0.04	103	13.4	0	112	430	86	79
58	10.681	0.184	0.070	0.39	77	0.69	103	13.0	-0.4	111	428	86	77
59	10.866	0.185	0.070	0.39	77	-0.34	103	13.0	0	111	426	86	79
60	11.050	0.184	0.070	0.39	77	0.78	103	12.1	-0.9	111	425	86	78
61	11.234	0.184	0.070	0.42	77	-0.04	103	12.8	0.7	110	425	86	77
62	11.418	0.184	0.070	0.42	77	0.4	103	12.5	-0.3	109	423	86	79
63	11.602	0.184	0.070	0.40	77	-0.09	103	12.6	0.1	109	420	86	79
64	11.786	0.184	0.070	0.40	77	0.68	103	12.3	-0.3	109	418	86	78
65	11.970	0.184	0.070	0.40	77	-0.02	103	12.1	-0.2	109	417	86	78

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 4

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/11/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
66	12.155	0.185	0.070	0.40	77	0.61	103	12.1	0	108	415	86	78
67	12.339	0.184	0.070	0.40	77	0.02	103	12.0	-0.1	108	414	86	78
68	12.523	0.184	0.070	0.40	77	-0.46	103	11.7	-0.3	108	412	86	78
69	12.707	0.184	0.070	0.39	78	0	102	11.7	0	107	409	86	78
70	12.891	0.184	0.070	0.40	78	-0.11	102	11.6	-0.1	106	408	86	77
71	13.075	0.184	0.070	0.40	78	-0.36	102	11.5	-0.1	107	406	86	77
72	13.260	0.185	0.070	0.39	78	-0.33	103	11.3	-0.2	107	405	85	78
73	13.444	0.184	0.070	0.39	78	0.06	102	11.1	-0.2	106	402	85	78
74	13.628	0.184	0.070	0.39	78	-0.07	102	11.6	0.5	106	401	85	78
75	13.812	0.184	0.070	0.39	78	0.06	102	11.2	-0.4	106	401	85	77
76	13.996	0.184	0.070	0.39	78	-0.08	102	10.8	-0.4	106	399	85	78
77	14.180	0.184	0.070	0.39	78	0.43	102	10.7	-0.1	106	396	84	78
78	14.365	0.185	0.070	0.39	78	0.68	103	10.6	-0.1	105	392	84	78
79	14.549	0.184	0.070	0.39	78	-0.11	102	10.5	-0.1	104	388	84	78
80	14.733	0.184	0.070	0.39	78	-0.1	102	10.3	-0.2	104	386	84	77
81	14.917	0.184	0.070	0.39	78	0.51	102	10.3	0	104	383	84	77
82	15.101	0.184	0.070	0.39	78	0.13	102	10.2	-0.1	103	379	84	78
83	15.285	0.184	0.070	0.39	78	0	102	10.1	-0.1	103	377	83	76
84	15.470	0.185	0.070	0.39	78	-0.05	102	9.9	-0.2	102	375	83	77
85	15.654	0.184	0.070	0.39	78	-0.53	102	9.7	-0.2	102	371	83	77
86	15.838	0.184	0.070	0.39	78	-0.23	102	9.7	0	102	369	84	77
87	16.022	0.184	0.070	0.39	78	0.75	102	9.7	0	101	367	83	78
88	16.206	0.184	0.070	0.39	78	-0.38	102	9.6	-0.1	101	366	84	77
89	16.390	0.184	0.070	0.39	78	-0.44	102	9.5	-0.1	101	363	83	77
90	16.575	0.185	0.070	0.39	78	0.68	102	10.1	0.6	101	361	83	76
91	16.759	0.184	0.070	0.39	78	0.69	102	9.1	-1	101	360	83	76
92	16.943	0.184	0.070	0.39	79	0.08	102	9.3	0.2	100	359	83	76
93	17.127	0.184	0.070	0.39	79	-0.32	102	8.3	-1	100	356	83	76
94	17.311	0.184	0.070	0.39	79	-0.53	102	8.8	0.5	100	355	83	76
95	17.495	0.184	0.070	0.39	79	-0.01	102	8.9	0.1	100	354	83	77
96	17.679	0.184	0.070	0.38	79	-0.15	102	8.8	-0.1	100	354	83	76
97	17.864	0.185	0.070	0.40	79	-0.02	102	8.8	0	99	353	83	77
98	18.048	0.184	0.070	0.40	79	-0.08	101	8.6	-0.2	99	351	83	77

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 4

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/11/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
99	18.232	0.184	0.070	0.40	79	0.68	101	8.4	-0.2	98	349	83	77
100	18.416	0.184	0.070	0.40	79	0.12	101	8.5	0.1	98	350	83	77
101	18.600	0.184	0.070	0.40	79	0.15	101	8.4	-0.1	99	350	83	76
102	18.784	0.184	0.070	0.40	79	1.19	101	8.0	-0.4	99	348	83	76
103	18.969	0.185	0.070	0.40	79	-0.01	102	8.2	0.2	98	349	83	77
104	19.153	0.184	0.070	0.40	79	0.12	101	8.1	-0.1	98	349	83	76
105	19.337	0.184	0.070	0.40	79	0.8	101	8.1	0	98	351	83	76
106	19.521	0.184	0.070	0.40	79	0.62	101	8.5	0.4	98	351	83	76
107	19.705	0.184	0.070	0.40	79	-0.38	101	7.7	-0.8	98	348	83	76
108	19.889	0.184	0.070	0.40	79	0.02	101	7.7	0	97	346	83	76
109	20.074	0.185	0.070	0.40	79	-0.28	102	7.5	-0.2	97	346	83	75
110	20.258	0.184	0.070	0.40	79	-0.25	101	7.4	-0.1	97	347	83	76
111	20.442	0.184	0.070	0.40	79	0.68	101	7.5	0.1	97	343	82	76
112	20.626	0.184	0.070	0.40	79	-0.03	101	7.5	0	96	340	82	77
113	20.810	0.184	0.070	0.40	79	0.78	101	7.2	-0.3	96	336	82	76
114	20.994	0.184	0.070	0.40	79	0.55	101	7.3	0.1	95	332	82	76
115	21.179	0.185	0.070	0.40	79	0.04	102	7.3	0	95	322	82	75
116	21.363	0.184	0.070	0.40	79	0.7	101	7.8	0.5	94	314	82	75
117	21.547	0.184	0.070	0.39	79	0.65	101	7.1	-0.7	93	309	82	75
118	21.731	0.184	0.070	0.40	79	0.82	101	7.2	0.1	92	304	82	74
119	21.915	0.184	0.070	0.40	79	0.3	101	7.1	-0.1	92	300	82	74
120	22.099	0.184	0.070	0.40	79	-0.43	101	6.5	-0.6	92	295	82	74
121	22.283	0.184	0.070	0.40	79	-0.27	101	7.0	0.5	91	292	82	75
122	22.468	0.185	0.070	0.40	79	0.19	101	6.9	-0.1	91	288	82	75
123	22.652	0.184	0.070	0.40	79	-0.46	101	6.9	0	91	286	82	75
124	22.836	0.184	0.070	0.40	79	0.86	101	7.1	0.2	90	284	82	74
125	23.020	0.184	0.070	0.39	79	0.16	101	6.8	-0.3	90	281	82	74
126	23.204	0.184	0.070	0.40	79	0.28	101	6.8	0	90	279	82	74
127	23.388	0.184	0.070	0.40	79	0.22	101	6.9	0.1	89	276	82	74
128	23.573	0.185	0.070	0.40	79	-0.23	101	6.6	-0.3	89	274	82	74
129	23.757	0.184	0.070	0.39	79	0.05	101	6.6	0	89	273	82	75
130	23.941	0.184	0.070	0.40	79	0.24	101	7.2	0.6	89	271	82	74
131	24.125	0.184	0.070	0.40	79	0.34	100	6.6	-0.6	88	269	81	74

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 4

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/11/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
132	24.309	0.184	0.070	0.39	79	-0.19	100	6.6	0	88	265	81	73
133	24.493	0.184	0.070	0.39	79	0.1	100	6.5	-0.1	88	260	81	73
134	24.678	0.185	0.070	0.40	79	0.07	101	6.9	0.4	87	257	81	74
135	24.862	0.184	0.070	0.39	79	1.08	100	6.4	-0.5	87	253	82	73
136	25.046	0.184	0.070	0.39	79	-0.3	100	6.3	-0.1	87	252	82	73
137	25.230	0.184	0.070	0.39	79	-0.11	100	6.3	0	86	251	83	72
138	25.414	0.184	0.070	0.39	79	0.44	100	6.4	0.1	86	249	84	73
139	25.598	0.184	0.070	0.38	79	0.68	100	6.2	-0.2	85	247	85	73
140	25.783	0.185	0.070	0.38	79	0.25	101	6.3	0.1	85	244	85	74
141	25.967	0.184	0.070	0.38	79	0.16	100	6.4	0.1	85	244	86	72
142	26.151	0.184	0.070	0.38	79	0.2	100	6.2	-0.2	85	243	87	73
143	26.335	0.184	0.070	0.37	79	-0.37	100	6.2	0	85	241	87	73
144	26.519	0.184	0.070	0.37	79	0.24	100	6.6	0.4	85	240	87	71
145	26.703	0.184	0.070	0.41	79	1.11	100	6.2	-0.4	85	239	88	72
146	26.888	0.185	0.070	0.40	79	0.67	101	6.2	0	84	238	88	72
147	27.072	0.184	0.070	0.40	79	0.51	100	5.9	-0.3	84	236	88	73
148	27.256	0.184	0.070	0.39	79	0.36	100	6.1	0.2	84	235	89	72
149	27.440	0.184	0.070	0.40	79	0.42	100	6.0	-0.1	84	235	88	72
150	27.624	0.184	0.070	0.39	79	-0.11	100	5.9	-0.1	84	234	87	72
151	27.808	0.184	0.070	0.39	79	0.17	100	5.7	-0.2	83	232	85	73
152	27.992	0.184	0.070	0.39	79	0.85	100	5.9	0.2	84	231	84	72
153	28.177	0.185	0.070	0.39	79	1.09	101	5.8	-0.1	84	230	84	72
154	28.361	0.184	0.070	0.38	79	0.21	100	5.9	0.1	83	230	84	72
155	28.545	0.184	0.070	0.39	79	0.23	100	5.9	0	83	229	85	73
156	28.729	0.184	0.070	0.40	79	0.63	100	5.6	-0.3	83	228	84	72
157	28.913	0.184	0.070	0.39	79	1.4	100	5.8	0.2	83	227	84	72
158	29.097	0.184	0.070	0.39	79	0.49	100	5.2	-0.6	83	226	83	72
159	29.282	0.185	0.070	0.39	79	0.37	101	5.7	0.5	83	226	83	72
160	29.466	0.184	0.070	0.39	79	0.02	100	5.7	0	82	225	83	71
161	29.650	0.184	0.070	0.38	79	0.7	100	5.9	0.2	82	224	82	72
162	29.834	0.184	0.070	0.38	79	0.1	100	5.8	-0.1	82	223	82	72
163	30.018	0.184	0.070	0.38	79	0.72	100	5.6	-0.2	82	222	82	72
164	30.202	0.184	0.070	0.41	79	0.22	100	5.6	0	82	221	82	71

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 4

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/11/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
165	30.387	0.185	0.070	0.39	79	1.41	100	5.5	-0.1	82	220	82	72
166	30.571	0.184	0.070	0.38	79	1.3	100	5.5	0	82	220	83	72
167	30.755	0.184	0.070	0.38	79	1.31	100	5.5	0	82	219	83	71
168	30.939	0.184	0.070	0.38	79	1.61	100	5.4	-0.1	82	220	84	71
169	31.123	0.184	0.070	0.38	79	0.5	100	5.4	0	82	218	85	71
170	31.307	0.184	0.070	0.37	79	1.12	100	5.4	0	82	218	85	71
171	31.492	0.185	0.070	0.39	79	0.95	100	5.4	0	82	218	85	71
172	31.676	0.184	0.070	0.39	79	0.31	100	5.4	0	81	218	86	71
173	31.860	0.184	0.070	0.39	79	1.14	100	5.3	-0.1	81	218	85	71
174	32.044	0.184	0.070	0.39	79	0.67	100	5.3	0	81	217	84	71
175	32.228	0.184	0.070	0.38	79	1.68	100	5.3	0	81	217	84	71
176	32.412	0.184	0.070	0.38	79	0.97	100	5.4	0.1	81	217	85	71
177	32.597	0.185	0.070	0.38	79	1.04	100	5.2	-0.2	81	216	85	71
178	32.781	0.184	0.070	0.38	79	1.73	100	5.0	-0.2	81	216	85	71
179	32.965	0.184	0.070	0.37	79	1.88	100	5.3	0.3	81	215	85	71
180	33.149	0.184	0.070	0.39	79	1.98	100	5.1	-0.2	81	215	85	71
181	33.333	0.184	0.070	0.38	79	1.91	100	5.1	0	81	214	85	71
182	33.517	0.184	0.070	0.38	79	1.24	100	5.0	-0.1	81	215	84	71
183	33.701	0.184	0.070	0.38	79	1.28	100	5.1	0.1	81	214	84	71
184	33.886	0.185	0.070	0.40	79	1.3	100	4.5	-0.6	81	214	84	71
185	34.070	0.184	0.070	0.39	79	1.44	100	4.9	0.4	81	214	84	71
186	34.254	0.184	0.070	0.39	79	1.42	100	4.8	-0.1	81	215	84	70
187	34.438	0.184	0.070	0.39	79	1.46	100	4.8	0	81	216	84	70
188	34.622	0.184	0.070	0.39	79	1.25	100	4.9	0.1	81	217	84	69
189	34.806	0.184	0.070	0.38	79	1.08	100	4.8	-0.1	81	217	84	70
190	34.991	0.185	0.070	0.38	79	1.64	100	4.7	-0.1	81	220	83	71
191	35.175	0.184	0.070	0.38	79	1.24	100	4.7	0	81	223	83	71
192	35.359	0.184	0.070	0.39	79	1.48	100	5.0	0.3	81	226	83	71
193	35.543	0.184	0.070	0.38	79	2.57	100	4.7	-0.3	81	223	83	70
194	35.727	0.184	0.070	0.38	79	2.58	100	4.6	-0.1	81	220	84	70
195	35.911	0.184	0.070	0.38	79	2.27	100	4.5	-0.1	80	218	83	71
196	36.096	0.185	0.070	0.38	79	2.31	100	4.5	0	80	216	83	71
197	36.280	0.184	0.070	0.38	79	1.9	100	4.6	0.1	80	214	83	71

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 4

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/11/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
198	36.464	0.184	0.070	0.38	79	2.49	100	4.5	-0.1	80	214	83	71
199	36.648	0.184	0.070	0.38	79	2.18	100	3.4	-1.1	80	213	83	71
200	36.832	0.184	0.070	0.38	79	1.98	100	4.3	0.9	80	209	83	73
201	37.016	0.184	0.070	0.38	79	1.68	100	4.3	0	79	203	83	74
202	37.201	0.185	0.070	0.39	79	2.48	100	4.3	0	79	196	83	73
203	37.385	0.184	0.070	0.39	79	1.82	100	4.3	0	79	191	83	73
204	37.569	0.184	0.070	0.39	79	2.45	100	4.3	0	78	187	83	73
205	37.753	0.184	0.070	0.39	79	1.23	100	4.4	0.1	78	184	83	73
206	37.937	0.184	0.070	0.39	79	2.54	100	4.4	0	78	181	83	73
207	38.121	0.184	0.070	0.39	79	1.6	100	4.4	0	78	178	83	73
208	38.306	0.185	0.070	0.39	79	2.51	100	4.3	-0.1	77	176	83	73
209	38.490	0.184	0.070	0.39	79	1.56	99	4.4	0.1	77	174	83	73
210	38.674	0.184	0.070	0.40	79	2.39	99	4.3	-0.1	77	172	83	73
211	38.858	0.184	0.070	0.39	79	1.78	99	4.2	-0.1	77	170	83	73
212	39.042	0.184	0.070	0.39	79	1.62	99	4.3	0.1	77	169	83	72
213	39.226	0.184	0.070	0.40	79	2.32	99	3.4	-0.9	77	168	83	72
214	39.410	0.184	0.070	0.40	79	1.77	99	3.7	0.3	77	166	83	73
215	39.595	0.185	0.070	0.40	79	1.04	100	3.9	0.2	76	165	83	73
216	39.779	0.184	0.070	0.40	79	1.47	99	4.2	0.3	76	164	83	72
217	39.963	0.184	0.070	0.40	79	1.31	99	4.2	0	76	163	83	73
218	40.147	0.184	0.070	0.40	79	1.73	99	4.2	0	76	162	83	72
219	40.331	0.184	0.070	0.40	79	0.91	99	4.1	-0.1	76	160	83	72
220	40.515	0.184	0.070	0.40	79	1.53	99	3.6	-0.5	75	159	83	72
221	40.700	0.185	0.070	0.40	79	2.25	100	4.1	0.5	75	158	83	72
222	40.884	0.184	0.070	0.40	79	0.94	99	4.0	-0.1	75	158	83	72
223	41.068	0.184	0.070	0.40	79	2.22	99	4.1	0.1	75	157	83	72
224	41.252	0.184	0.070	0.41	79	1.57	99	4.1	0	75	157	83	72
225	41.436	0.184	0.070	0.40	79	1.6	99	4.1	0	75	156	83	71
226	41.620	0.184	0.070	0.41	79	1.37	99	4.0	-0.1	75	156	83	72
227	41.805	0.185	0.070	0.40	79	0.87	100	4.1	0.1	75	155	83	72
228	41.989	0.184	0.070	0.41	79	2.25	99	4.1	0	75	155	83	72
229	42.173	0.184	0.070	0.41	79	2.19	99	4.1	0	74	154	83	72
230	42.357	0.184	0.070	0.41	79	2.16	99	4.0	-0.1	74	154	83	71

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 4

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/11/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
231	42.541	0.184	0.070	0.41	79	1.02	99	4.1	0.1	74	153	83	71
232	42.725	0.184	0.070	0.41	79	1.08	99	4.0	-0.1	74	153	83	72
233	42.910	0.185	0.070	0.41	79	0.9	100	4.1	0.1	74	152	83	72
234	43.094	0.184	0.070	0.41	79	0.97	99	3.9	-0.2	74	152	82	71
235	43.278	0.184	0.070	0.41	79	2.08	99	4.0	0.1	74	151	83	71
236	43.462	0.184	0.070	0.41	79	2.12	99	4.0	0	74	151	82	72
237	43.646	0.184	0.070	0.42	79	1.17	99	3.9	-0.1	74	150	83	72
238	43.830	0.184	0.070	0.41	79	1.97	99	4.1	0.2	74	149	82	71
239	44.015	0.185	0.070	0.42	79	1.19	100	4.0	-0.1	74	149	82	71
240	44.199	0.184	0.070	0.39	79	0.75	99	4.0	0	74	149	83	71
241	44.383	0.184	0.070	0.39	79	1.05	99	4.0	0	73	148	83	71
242	44.567	0.184	0.070	0.39	79	1.36	99	4.0	0	73	148	83	71
243	44.751	0.184	0.070	0.39	79	1.24	99	4.0	0	73	148	82	71
244	44.935	0.184	0.070	0.39	79	1.15	99	3.9	-0.1	73	147	83	72
245	45.119	0.184	0.070	0.40	79	1.46	99	3.9	0	73	147	82	71
246	45.304	0.185	0.070	0.40	79	0.75	100	3.9	0	73	147	83	71
247	45.488	0.184	0.070	0.39	79	1.2	99	3.8	-0.1	73	147	83	71
248	45.672	0.184	0.070	0.39	79	0.89	99	4.0	0.2	73	146	83	71
249	45.856	0.184	0.070	0.39	79	1.99	99	4.0	0	73	146	82	71
250	46.040	0.184	0.070	0.39	79	1.38	99	3.9	-0.1	73	146	82	71
251	46.224	0.184	0.070	0.40	79	0.77	99	3.8	-0.1	73	146	83	71
252	46.409	0.185	0.070	0.40	79	2	100	3.8	0	73	146	82	71
253	46.593	0.184	0.070	0.40	79	1.46	99	3.7	-0.1	73	145	82	70
254	46.777	0.184	0.070	0.40	79	1.31	99	3.8	0.1	73	145	82	71
255	46.961	0.184	0.070	0.40	79	1.41	99	3.7	-0.1	73	145	83	71
256	47.145	0.184	0.070	0.40	79	0.89	99	3.6	-0.1	73	145	82	71
257	47.329	0.184	0.070	0.40	79	0.75	99	3.7	0.1	73	144	83	71
258	47.514	0.185	0.070	0.40	79	1.18	100	3.8	0.1	73	144	82	70
259	47.698	0.184	0.070	0.40	79	1.85	99	3.8	0	73	144	82	71
260	47.882	0.184	0.070	0.40	79	0.7	99	3.7	-0.1	73	144	83	71
261	48.066	0.184	0.070	0.40	79	0.56	99	3.8	0.1	73	144	82	71
262	48.250	0.184	0.070	0.40	79	1.85	99	4.2	0.4	73	144	82	70
263	48.434	0.184	0.070	0.40	79	1.18	99	3.7	-0.5	72	144	82	71

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 4

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/11/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
264	48.619	0.185	0.070	0.40	79	1.31	100	3.6	-0.1	73	144	83	70
265	48.803	0.184	0.070	0.41	79	1.04	99	3.6	0	73	144	82	71
266	48.987	0.184	0.070	0.40	79	2.2	99	3.5	-0.1	72	143	82	71
267	49.171	0.184	0.070	0.40	79	0.8	99	3.7	0.2	73	143	82	71
268	49.355	0.184	0.070	0.40	79	0.93	99	3.0	-0.7	72	143	82	70
269	49.539	0.184	0.070	0.40	79	0.5	99	3.6	0.6	72	143	82	71
270	49.724	0.185	0.070	0.40	79	1.03	100	4.2	0.6	72	143	82	71
271	49.908	0.184	0.070	0.40	79	0.58	99	3.5	-0.7	72	143	82	70
272	50.092	0.184	0.070	0.40	79	0.73	99	3.5	0	72	143	82	70
273	50.276	0.184	0.070	0.40	79	1.79	99	3.6	0.1	72	143	83	70
274	50.460	0.184	0.070	0.41	79	1.07	99	3.5	-0.1	72	143	82	70
275	50.644	0.184	0.070	0.40	79	1.03	99	3.6	0.1	73	143	83	70
276	50.828	0.184	0.070	0.41	79	0.44	99	3.4	-0.2	72	143	82	70
277	51.013	0.185	0.070	0.41	79	1.2	100	3.6	0.2	72	142	82	70
278	51.197	0.184	0.070	0.41	79	0.63	99	3.4	-0.2	72	142	82	71
279	51.381	0.184	0.070	0.41	79	0.5	99	3.4	0	72	142	82	71
280	51.565	0.184	0.070	0.41	79	0.91	99	3.4	0	72	142	82	70
281	51.749	0.184	0.070	0.41	79	1.81	99	3.4	0	72	142	83	70
282	51.933	0.184	0.070	0.41	79	1.18	99	3.4	0	72	141	84	70
283	52.118	0.185	0.070	0.41	79	1.73	100	3.4	0	72	141	84	70
284	52.302	0.184	0.070	0.41	79	0.7	99	3.3	-0.1	72	141	85	70
285	52.486	0.184	0.070	0.41	79	1.41	99	3.4	0.1	72	141	86	70
286	52.670	0.184	0.070	0.41	79	0.76	99	3.4	0	72	140	86	71
287	52.854	0.184	0.070	0.41	79	1.28	99	3.3	-0.1	72	140	86	70
288	53.038	0.184	0.070	0.41	79	1.97	99	3.5	0.2	72	140	86	70
289	53.223	0.185	0.070	0.41	79	0.96	100	3.3	-0.2	72	139	86	70
290	53.407	0.184	0.070	0.41	79	1.85	99	3.3	0	72	139	86	70
291	53.591	0.184	0.070	0.41	79	1.22	99	3.2	-0.1	72	139	86	70
292	53.775	0.184	0.070	0.41	79	1.61	99	3.4	0.2	72	139	85	70
293	53.959	0.184	0.070	0.42	79	1.09	99	3.3	-0.1	72	139	85	70
294	54.143	0.184	0.070	0.42	79	1.55	99	3.3	0	72	139	85	70
295	54.328	0.185	0.070	0.41	79	1.64	100	3.3	0	72	139	85	70
296	54.512	0.184	0.070	0.41	79	0.88	99	3.4	0.1	72	138	85	70

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 4

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/11/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
297	54.696	0.184	0.070	0.41	79	1.69	99	3.3	-0.1	72	138	85	70
298	54.880	0.184	0.070	0.41	79	1.69	99	3.3	0	72	138	85	70
299	55.064	0.184	0.070	0.41	79	1.03	99	3.3	0	72	137	85	70
300	55.248	0.184	0.070	0.41	79	1.69	99	3.2	-0.1	72	137	85	70
301	55.433	0.185	0.070	0.41	79	0.72	100	3.4	0.2	72	137	85	70
302	55.617	0.184	0.070	0.41	79	1.08	99	3.2	-0.2	72	137	85	70
303	55.801	0.184	0.070	0.42	79	0.32	99	3.2	0	72	137	85	70
304	55.985	0.184	0.070	0.42	79	0.7	99	3.3	0.1	72	137	85	70
305	56.169	0.184	0.070	0.42	79	1.11	99	3.2	-0.1	71	137	85	70
306	56.353	0.184	0.070	0.42	79	1.5	99	3.3	0.1	71	137	85	70
307	56.537	0.184	0.070	0.42	79	1.03	99	3.2	-0.1	71	137	85	70
308	56.722	0.185	0.070	0.41	79	1.54	99	3.1	-0.1	71	137	85	69
309	56.906	0.184	0.070	0.42	79	1.7	99	3.1	0	71	137	85	69
310	57.090	0.184	0.070	0.41	79	0.89	99	3.2	0.1	71	136	85	69
311	57.274	0.184	0.070	0.42	79	1.61	99	2.4	-0.8	72	136	85	70
312	57.458	0.184	0.070	0.42	79	0.81	99	3.1	0.7	71	136	85	69
313	57.642	0.184	0.070	0.42	79	1.64	99	2.5	-0.6	71	136	85	69
314	57.827	0.185	0.070	0.42	79	1.71	99	3.2	0.7	71	136	85	69
315	58.011	0.184	0.070	0.38	79	0.26	99	3.1	-0.1	71	136	85	70
316	58.195	0.184	0.070	0.38	79	0.24	99	2.9	-0.2	71	136	85	70
317	58.379	0.184	0.070	0.38	79	0.67	99	3.0	0.1	71	136	85	69
318	58.563	0.184	0.070	0.39	79	0.86	99	3.0	0	71	136	85	70
319	58.747	0.184	0.070	0.38	79	0.88	99	3.1	0.1	71	136	85	70
320	58.932	0.185	0.070	0.38	79	1.07	99	3.1	0	71	136	85	70
321	59.116	0.184	0.070	0.38	79	0.57	99	2.9	-0.2	71	136	85	69
322	59.300	0.184	0.070	0.38	79	1.43	99	3.0	0.1	71	136	85	69
323	59.484	0.184	0.070	0.38	79	0.35	99	3.1	0.1	71	135	85	69
324	59.668	0.184	0.070	0.38	79	0.82	99	3.0	-0.1	71	135	85	69
325	59.852	0.184	0.070	0.40	78	1.56	99	2.9	-0.1	71	136	85	70
326	60.037	0.185	0.070	0.40	78	1.03	100	2.9	0	71	136	85	69
327	60.221	0.184	0.070	0.40	78	1.06	99	2.9	0	71	136	86	69
328	60.405	0.184	0.070	0.40	78	1.58	99	2.9	0	71	136	86	69
329	60.589	0.184	0.070	0.40	78	0.18	99	2.7	-0.2	71	135	86	69

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 4

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/11/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
330	60.773	0.184	0.070	0.40	78	0.27	99	3.0	0.3	71	136	86	69
331	60.957	0.184	0.070	0.40	78	1.46	99	2.9	-0.1	71	136	86	69
332	61.141	0.184	0.070	0.40	78	0.95	99	2.9	0	71	136	86	69
333	61.326	0.185	0.070	0.40	78	1.5	100	2.9	0	71	136	86	69
334	61.510	0.184	0.070	0.40	78	1.52	99	2.9	0	71	136	86	70
335	61.694	0.184	0.070	0.40	78	0.56	99	2.9	0	71	136	85	69
336	61.878	0.184	0.070	0.40	78	0.64	99	2.7	-0.2	71	136	84	69
337	62.062	0.184	0.070	0.40	78	0.41	99	2.8	0.1	71	136	84	69
338	62.246	0.184	0.070	0.40	78	0.28	99	2.6	-0.2	71	136	84	70
339	62.431	0.185	0.070	0.40	78	0.77	100	2.8	0.2	71	136	84	69
340	62.615	0.184	0.070	0.40	78	0.42	99	2.7	-0.1	71	136	84	70
341	62.799	0.184	0.070	0.40	78	0.2	99	2.5	-0.2	71	136	84	69
342	62.983	0.184	0.070	0.40	78	0.5	99	2.8	0.3	71	135	84	69
343	63.167	0.184	0.070	0.40	78	0.22	99	2.7	-0.1	71	135	84	69
344	63.351	0.184	0.070	0.40	78	0.74	99	2.7	0	71	135	84	69
345	63.536	0.185	0.070	0.41	78	0.91	100	2.7	0	71	135	84	69
346	63.720	0.184	0.070	0.41	78	1.57	99	2.8	0.1	71	135	84	69
347	63.904	0.184	0.070	0.40	78	0.61	99	2.1	-0.7	71	135	84	69
348	64.088	0.184	0.070	0.40	78	0.9	99	2.7	0.6	71	135	84	69
349	64.272	0.184	0.070	0.40	78	0.67	99	2.5	-0.2	71	135	84	69
350	64.456	0.184	0.070	0.40	78	0.83	99	2.5	0	71	135	84	69
351	64.641	0.185	0.070	0.41	78	1.4	100	2.7	0.2	71	135	84	69
352	64.825	0.184	0.070	0.40	78	0.22	99	2.7	0	71	135	84	69
353	65.009	0.184	0.070	0.40	78	0.89	99	2.7	0	71	135	84	69
354	65.193	0.184	0.070	0.40	78	0.88	99	2.6	-0.1	71	135	84	69
355	65.377	0.184	0.070	0.40	78	1.37	99	2.6	0	71	135	84	69
356	65.561	0.184	0.070	0.40	78	1.04	99	2.6	0	71	135	84	69
357	65.746	0.185	0.070	0.41	78	1.01	100	2.7	0.1	71	135	84	69
358	65.930	0.184	0.070	0.40	78	0.78	99	2.5	-0.2	71	136	85	69
359	66.114	0.184	0.070	0.40	78	1.5	99	2.6	0.1	71	135	84	69
360	66.298	0.184	0.070	0.40	78	0.17	99	2.6	0	71	135	85	69
361	66.482	0.184	0.070	0.41	78	1.4	99	2.5	-0.1	71	135	84	69
362	66.666	0.184	0.070	0.40	78	1.37	99	2.5	0	71	135	84	69

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 4

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/11/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
363	66.850	0.184	0.070	0.41	78	0.74	99	2.5	0	71	135	84	69
364	67.035	0.185	0.070	0.41	78	1.4	100	2.5	0	71	135	84	69
365	67.219	0.184	0.070	0.40	78	0.44	99	2.5	0	71	134	84	69
366	67.403	0.184	0.070	0.41	78	0.4	99	2.9	0.4	71	134	84	69
367	67.587	0.184	0.070	0.41	78	0.15	99	2.7	-0.2	71	134	84	69
368	67.771	0.184	0.070	0.40	78	0.82	99	2.5	-0.2	71	134	85	69
369	67.955	0.184	0.070	0.40	78	1.34	99	2.4	-0.1	71	134	84	69
370	68.140	0.185	0.070	0.41	78	1.34	100	2.4	0	71	134	84	69
371	68.324	0.184	0.070	0.41	78	1.47	99	2.5	0.1	71	134	84	70
372	68.508	0.184	0.070	0.41	78	0.7	99	2.4	-0.1	71	133	85	69
373	68.692	0.184	0.070	0.41	78	1.51	99	2.3	-0.1	71	134	84	69
374	68.876	0.184	0.070	0.41	78	0.13	99	2.5	0.2	71	133	84	69
375	69.060	0.184	0.070	0.41	78	1.19	99	1.9	-0.6	71	133	84	69
376	69.245	0.185	0.070	0.40	78	1.42	100	1.8	-0.1	71	133	84	69
377	69.429	0.184	0.070	0.41	78	1.41	99	2.2	0.4	71	133	84	69
378	69.613	0.184	0.070	0.41	78	1.51	99	2.4	0.2	71	133	84	69
379	69.797	0.184	0.070	0.41	78	0.43	99	2.4	0	71	133	84	69
380	69.981	0.184	0.070	0.41	78	0.2	99	2.4	0	71	133	84	69
381	70.165	0.184	0.070	0.41	78	0.7	99	2.4	0	71	133	84	69
382	70.350	0.185	0.070	0.41	78	0.63	100	2.7	0.3	71	133	84	69
383	70.534	0.184	0.070	0.41	78	0.51	99	2.3	-0.4	71	133	84	69
384	70.718	0.184	0.070	0.41	78	1.45	99	2.3	0	71	133	84	69
385	70.902	0.184	0.070	0.40	78	0.63	99	2.3	0	71	133	84	69
386	71.086	0.184	0.070	0.41	78	0.72	99	2.2	-0.1	71	132	84	69
387	71.270	0.184	0.070	0.41	78	0.43	99	2.3	0.1	71	132	84	69
388	71.455	0.185	0.070	0.41	78	1.44	100	2.3	0	71	132	84	69
389	71.639	0.184	0.070	0.41	78	1.44	99	2.1	-0.2	71	132	84	69
390	71.823	0.184	0.070	0.41	78	0.57	99	2.2	0.1	70	132	84	69
391	72.007	0.184	0.070	0.41	78	1.47	99	2.2	0	70	132	84	69
392	72.191	0.184	0.070	0.41	78	0.44	99	2.2	0	70	131	84	69
393	72.375	0.184	0.070	0.41	78	0.12	99	2.3	0.1	71	131	84	69
394	72.559	0.184	0.070	0.41	78	0.45	99	2.1	-0.2	71	132	84	69
395	72.744	0.185	0.070	0.41	78	0.8	100	2.2	0.1	70	131	84	69

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 4

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/11/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
396	72.928	0.184	0.070	0.41	78	1.15	99	2.0	-0.2	71	132	84	69
397	73.112	0.184	0.070	0.41	78	0.19	99	2.3	0.3	70	132	84	69
398	73.296	0.184	0.070	0.41	78	0.7	99	2.2	-0.1	70	132	84	69
399	73.480	0.184	0.070	0.41	78	0.41	99	2.2	0	70	132	84	68
400	73.664	0.184	0.070	0.40	78	0.95	99	2.1	-0.1	70	131	84	68
401	73.849	0.185	0.070	0.41	78	0.31	100	2.1	0	70	131	84	69
402	74.033	0.184	0.070	0.41	78	1.06	99	2.1	0	70	132	84	69
403	74.217	0.184	0.070	0.41	78	0.25	99	2.1	0	70	131	84	68
404	74.401	0.184	0.070	0.41	78	0.25	99	2.0	-0.1	70	131	84	69
405	74.585	0.184	0.070	0.40	78	0.36	99	2.0	0	70	131	84	69
406	74.769	0.184	0.070	0.41	78	0.23	99	2.1	0.1	70	131	84	68
407	74.954	0.185	0.070	0.41	78	0.8	100	2.2	0.1	70	131	84	69
408	75.138	0.184	0.070	0.41	78	0.13	99	2.6	0.4	70	131	84	68
409	75.322	0.184	0.070	0.41	78	0.33	99	2.2	-0.4	70	131	84	68
410	75.506	0.184	0.070	0.40	78	1.39	99	2.2	0	70	131	84	69
411	75.690	0.184	0.070	0.41	78	0.3	99	2.1	-0.1	70	131	84	69
412	75.874	0.184	0.070	0.41	78	1.5	99	2.1	0	70	130	84	69
413	76.059	0.185	0.070	0.41	78	0.65	100	1.9	-0.2	70	130	84	68
414	76.243	0.184	0.070	0.41	78	0.34	99	1.9	0	70	130	84	69
415	76.427	0.184	0.070	0.41	78	1.31	99	2.0	0.1	70	130	84	68
416	76.611	0.184	0.070	0.41	78	0.15	99	1.9	-0.1	70	131	84	68
417	76.795	0.184	0.070	0.41	78	1.01	99	2.0	0.1	70	131	84	69
418	76.979	0.184	0.070	0.41	78	0.11	99	1.8	-0.2	70	131	84	68
419	77.164	0.185	0.070	0.41	78	0.64	100	2.0	0.2	70	131	83	68
420	77.348	0.184	0.070	0.41	78	1.5	99	1.9	-0.1	70	131	84	69
421	77.532	0.184	0.070	0.41	78	1.29	99	1.9	0	70	131	84	68
422	77.716	0.184	0.070	0.41	78	0.24	99	1.9	0	70	131	84	68
423	77.900	0.184	0.070	0.41	78	1.43	99	1.9	0	70	131	83	68
424	78.084	0.184	0.070	0.41	78	0.84	99	1.8	-0.1	70	131	84	68
425	78.268	0.184	0.070	0.40	78	0.2	99	1.9	0.1	70	131	83	68
426	78.453	0.185	0.070	0.41	78	0.36	100	1.9	0	70	131	84	68
427	78.637	0.184	0.070	0.41	78	0.16	99	1.9	0	70	130	83	68
428	78.821	0.184	0.070	0.40	78	0.16	99	1.9	0	70	131	83	68

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 4

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/11/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
429	79.005	0.184	0.070	0.41	78	0.39	99	1.9	0	70	130	83	69
430	79.189	0.184	0.070	0.41	78	0.7	99	1.7	-0.2	70	130	84	68
431	79.373	0.184	0.070	0.41	78	0.99	99	1.9	0.2	70	130	83	68
432	79.558	0.185	0.070	0.41	78	0.53	100	1.8	-0.1	70	131	83	68
433	79.742	0.184	0.070	0.41	78	1.52	99	1.7	-0.1	70	131	83	68
434	79.926	0.184	0.070	0.41	78	1	99	1.9	0.2	70	131	83	68
435	80.110	0.184	0.070	0.41	78	0.17	99	1.8	-0.1	70	131	83	68
436	80.294	0.184	0.070	0.40	78	0.44	99	1.8	0	70	131	84	68
437	80.478	0.184	0.070	0.41	78	1.41	99	1.6	-0.2	70	131	83	69
438	80.663	0.185	0.070	0.41	78	0.16	100	1.7	0.1	70	131	84	68
439	80.847	0.184	0.070	0.41	78	1.31	99	1.7	0	70	131	83	68
440	81.031	0.184	0.070	0.41	78	0.65	99	1.7	0	70	131	83	68
441	81.215	0.184	0.070	0.40	78	0.12	99	1.7	0	70	131	83	69
442	81.399	0.184	0.070	0.41	78	1.32	99	1.7	0	70	131	83	68
443	81.583	0.184	0.070	0.41	78	0.62	99	0.9	-0.8	70	131	83	68
444	81.768	0.185	0.070	0.40	78	0.52	100	1.4	0.5	70	131	83	68
445	81.952	0.184	0.070	0.41	78	1.24	99	1.5	0.1	70	131	83	68
446	82.136	0.184	0.070	0.40	78	0.82	99	1.6	0.1	70	132	83	68
447	82.320	0.184	0.070	0.40	78	0.35	99	1.7	0.1	70	132	83	68
448	82.504	0.184	0.070	0.40	78	0.33	99	1.5	-0.2	70	132	83	68
449	82.688	0.184	0.070	0.40	78	0.8	99	1.6	0.1	70	133	83	68
450	82.873	0.185	0.070	0.40	78	0.69	100	1.6	0	70	133	84	68
451	83.057	0.184	0.070	0.41	78	0.43	99	1.6	0	70	132	83	68
452	83.241	0.184	0.070	0.41	78	0.37	99	1.3	-0.3	70	132	84	68
453	83.425	0.184	0.070	0.40	78	0.63	99	1.6	0.3	70	132	83	68
454	83.609	0.184	0.070	0.41	78	0.5	99	1.4	-0.2	70	132	83	68
455	83.793	0.184	0.070	0.40	78	0.33	99	1.5	0.1	70	132	83	68
456	83.977	0.184	0.070	0.41	78	0.66	99	1.6	0.1	70	132	84	68
457	84.162	0.185	0.070	0.40	78	0.2	100	1.4	-0.2	70	132	83	68
458	84.346	0.184	0.070	0.41	78	1.34	99	1.5	0.1	70	131	84	68
459	84.530	0.184	0.070	0.41	78	1.28	99	1.3	-0.2	70	132	84	68
460	84.714	0.184	0.070	0.41	78	1.4	99	1.7	0.4	70	131	84	68
461	84.898	0.184	0.070	0.41	78	0.19	99	1.5	-0.2	70	131	84	68

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 4

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/11/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
462	85.082	0.184	0.070	0.41	78	0.8	99	1.3	-0.2	70	131	84	68
463	85.267	0.185	0.070	0.41	78	0.1	100	1.5	0.2	70	130	83	68
464	85.451	0.184	0.070	0.41	78	0.86	99	1.4	-0.1	70	130	84	68
465	85.635	0.184	0.070	0.40	78	1.16	99	1.4	0	70	131	83	68
466	85.819	0.184	0.070	0.41	78	1.3	99	1.4	0	70	130	84	68
467	86.003	0.184	0.070	0.41	78	0.4	99	1.3	-0.1	70	130	83	68
468	86.187	0.184	0.070	0.41	78	0.85	99	1.4	0.1	70	130	84	68
469	86.372	0.185	0.070	0.41	78	1.34	100	1.4	0	70	130	84	68
470	86.556	0.184	0.070	0.41	78	0.12	99	1.4	0	70	130	84	68
471	86.740	0.184	0.070	0.41	78	0.1	99	1.4	0	70	130	83	68
472	86.924	0.184	0.070	0.40	78	0.75	99	1.3	-0.1	70	130	84	68
473	87.108	0.184	0.070	0.41	78	0.98	99	1.4	0.1	70	129	83	68
474	87.292	0.184	0.070	0.41	78	0.85	99	1.4	0	70	129	84	68
475	87.477	0.185	0.070	0.41	78	0.54	100	1.3	-0.1	70	129	83	68
476	87.661	0.184	0.070	0.41	78	0.23	99	1.3	0	70	129	84	68
477	87.845	0.184	0.070	0.41	78	1.51	99	1.3	0	70	129	83	68
478	88.029	0.184	0.070	0.41	78	1.49	99	1.6	0.3	70	128	83	68
479	88.213	0.184	0.070	0.41	78	1.42	99	1.3	-0.3	70	129	83	68
480	88.397	0.184	0.070	0.41	78	0.86	99	0.6	-0.7	70	129	84	68
481	88.582	0.185	0.070	0.40	78	0.66	100	1.2	0.6	70	128	83	68
482	88.766	0.184	0.070	0.41	78	0.79	99	1.3	0.1	70	128	84	68
483	88.950	0.184	0.070	0.41	78	0.76	99	1.2	-0.1	70	128	83	68
484	89.134	0.184	0.070	0.41	78	1.34	99	1.3	0.1	70	128	84	68
485	89.318	0.184	0.070	0.41	78	0.12	99	1.2	-0.1	70	128	83	68
486	89.502	0.184	0.070	0.41	78	1.02	99	1.2	0	70	129	83	68
487	89.686	0.184	0.070	0.41	78	0.21	99	1.2	0	70	128	84	68
488	89.871	0.185	0.070	0.41	78	0.82	100	1.2	0	70	128	84	68
489	90.055	0.184	0.070	0.41	78	0.15	99	1.1	-0.1	70	128	83	68
490	90.239	0.184	0.070	0.41	78	0.41	99	1.2	0.1	70	127	84	68
491	90.423	0.184	0.070	0.41	78	0.8	99	1.2	0	70	128	83	68
492	90.607	0.184	0.070	0.41	77	0.83	99	1.1	-0.1	70	128	83	68
493	90.791	0.184	0.070	0.41	77	1.07	99	1.1	0	70	128	83	68
494	90.976	0.185	0.070	0.41	77	0.78	100	1.1	0	70	127	83	68

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 4

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/11/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
495	91.160	0.184	0.070	0.41	77	0.73	99	1.2	0.1	69	127	83	68
496	91.344	0.184	0.070	0.41	77	1.43	99	1.1	-0.1	69	128	83	68
497	91.528	0.184	0.070	0.41	77	0.25	99	1.3	0.2	70	127	84	68
498	91.712	0.184	0.070	0.41	77	0.2	99	1.1	-0.2	70	127	84	68
499	91.896	0.184	0.070	0.41	77	1.42	99	1.1	0	70	126	84	68
500	92.081	0.185	0.070	0.41	77	1.31	100	0.4	-0.7	70	127	84	68
501	92.265	0.184	0.070	0.41	77	1.43	99	1.2	0.8	70	127	84	68
502	92.449	0.184	0.070	0.41	77	0.55	99	1.1	-0.1	70	126	84	68
503	92.633	0.184	0.070	0.41	77	1.19	99	1.1	0	70	126	84	68
504	92.817	0.184	0.070	0.41	77	0.48	99	1.1	0	69	126	84	68
505	93.001	0.184	0.070	0.41	77	0.49	99	1.0	-0.1	69	126	84	68
506	93.186	0.185	0.070	0.41	77	0.25	100	0.9	-0.1	69	126	84	68
507	93.370	0.184	0.070	0.41	77	0.12	99	1.1	0.2	70	126	84	68
508	93.554	0.184	0.070	0.41	77	0.14	99	0.9	-0.2	69	126	84	68
509	93.738	0.184	0.070	0.40	77	0.59	99	0.9	0	70	126	84	68
510	93.922	0.184	0.070	0.41	77	1.09	99	0.9	0	70	126	84	67
511	94.106	0.184	0.070	0.41	77	1.49	99	0.9	0	70	126	84	68
512	94.291	0.185	0.070	0.41	77	0.86	100	0.9	0	69	126	84	68
513	94.475	0.184	0.070	0.41	77	1.41	99	1.0	0.1	70	126	84	68
514	94.659	0.184	0.070	0.41	77	0.63	99	0.9	-0.1	70	126	84	68
515	94.843	0.184	0.070	0.41	77	0.51	99	0.9	0	70	126	84	68
516	95.027	0.184	0.070	0.41	77	1.38	99	0.9	0	70	126	84	68
517	95.211	0.184	0.070	0.41	77	0.74	99	0.9	0	69	126	84	68
518	95.395	0.184	0.070	0.41	77	0.71	99	0.8	-0.1	69	126	84	68
519	95.580	0.185	0.070	0.41	77	0.15	100	0.9	0.1	69	125	84	68
520	95.764	0.184	0.070	0.41	77	1.34	99	0.7	-0.2	69	125	84	68
521	95.948	0.184	0.070	0.41	77	0.27	99	0.8	0.1	69	125	84	68
522	96.132	0.184	0.070	0.41	77	0.22	99	0.8	0	69	125	84	68
523	96.316	0.184	0.070	0.41	77	0.42	99	0.8	0	69	125	84	68
524	96.500	0.184	0.070	0.41	77	1.39	99	0.6	-0.2	69	124	84	68
525	96.685	0.185	0.070	0.41	77	1.05	100	0.6	0	69	124	84	68
526	96.869	0.184	0.070	0.41	77	0.41	99	0.7	0.1	69	123	84	68
527	97.053	0.184	0.070	0.41	77	0.07	99	0.8	0.1	69	123	84	68

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 4

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/11/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
528	97.237	0.184	0.070	0.41	77	1.13	99	0.8	0	69	123	84	68
529	97.421	0.184	0.070	0.41	77	1.01	99	0.8	0	69	123	84	68
530	97.605	0.184	0.070	0.41	77	1.35	99	0.8	0	69	123	84	68
531	97.790	0.185	0.070	0.41	77	1.36	100	0.9	0.1	69	122	84	68
532	97.974	0.184	0.070	0.41	77	1.38	99	0.8	-0.1	69	122	84	68
533	98.158	0.184	0.070	0.41	77	1.45	99	0.7	-0.1	69	122	84	68
534	98.342	0.184	0.070	0.42	77	1.38	99	0.7	0	69	121	84	68
535	98.526	0.184	0.070	0.41	77	1.44	99	0.7	0	69	121	84	68
536	98.710	0.184	0.070	0.41	77	0.71	99	0.7	0	69	121	84	67
537	98.895	0.185	0.070	0.41	77	0.11	100	0.9	0.2	69	121	84	68
538	99.079	0.184	0.070	0.41	77	0.2	99	0.7	-0.2	69	120	84	68
539	99.263	0.184	0.070	0.41	77	0.3	99	0.8	0.1	69	120	84	68
540	99.447	0.184	0.070	0.41	77	0.58	99	0.7	-0.1	69	120	84	68
541	99.631	0.184	0.070	0.41	77	0.34	99	0.6	-0.1	69	119	84	68
542	99.815	0.184	0.070	0.41	77	1.45	99	0.6	0	69	119	84	67
543	99.999	0.184	0.070	0.41	77	1.34	99	0.4	-0.2	69	119	84	67
544	100.184	0.185	0.070	0.41	77	0.98	100	0.6	0.2	69	119	84	67
545	100.368	0.184	0.070	0.41	77	0.51	99	0.6	0	69	119	84	68
546	100.552	0.184	0.070	0.41	77	1.39	99	0.7	0.1	69	118	84	67
547	100.736	0.184	0.070	0.41	77	1.69	99	0.6	-0.1	69	118	84	68
548	100.920	0.184	0.070	0.41	77	0.6	99	0.8	0.2	69	118	84	68
549	101.104	0.184	0.070	0.41	77	0.32	99	0.7	-0.1	69	117	84	67
550	101.289	0.185	0.070	0.41	77	0.48	100	0.6	-0.1	69	118	84	68
551	101.473	0.184	0.070	0.42	77	0.04	99	0.5	-0.1	69	118	84	67
552	101.657	0.184	0.070	0.41	77	-0.03	99	0.7	0.2	69	117	84	68
553	101.841	0.184	0.070	0.41	77	0.22	99	0.4	-0.3	69	117	84	67
554	102.025	0.184	0.070	0.41	77	1.31	99	0.6	0.2	69	116	84	68
555	102.209	0.184	0.070	0.41	77	0.8	99	0.5	-0.1	68	116	84	67
556	102.394	0.185	0.070	0.41	77	1.34	100	0.6	0.1	68	116	84	67
557	102.578	0.184	0.070	0.42	77	1.22	99	0.6	0	69	116	84	67
558	102.762	0.184	0.070	0.41	77	0.6	99	0.5	-0.1	69	116	84	67
559	102.946	0.184	0.070	0.41	77	0.1	99	0.6	0.1	68	116	83	67
560	103.130	0.184	0.070	0.41	77	0.76	99	0.4	-0.2	68	115	84	67

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 4

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/11/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
561	103.314	0.184	0.070	0.41	77	0.47	99	0.5	0.1	68	115	84	67
562	103.499	0.185	0.070	0.41	77	0.22	100	0.5	0	68	115	84	67
563	103.683	0.184	0.070	0.41	77	0.32	99	0.9	0.4	68	115	83	67
564	103.867	0.184	0.070	0.41	77	0.71	99	0.6	-0.3	68	114	84	67
565	104.051	0.184	0.070	0.41	77	0.78	99	0.5	-0.1	68	114	83	67
566	104.235	0.184	0.070	0.41	77	0.35	99	0.0	-0.5	68	114	84	67
567	104.419	0.184	0.070	0.41	77	1.43	99	0.5	0.5	68	114	84	67
568	104.604	0.185	0.070	0.41	77	0.16	100	0.5	0	68	113	84	67
569	104.788	0.184	0.070	0.41	77	1.37	99	0.5	0	68	114	84	67
570	104.972	0.184	0.070	0.41	77	0.66	99	0.4	-0.1	68	114	84	67
571	105.156	0.184	0.070	0.41	77	1.32	99	0.4	0	68	113	84	67
572	105.340	0.184	0.070	0.41	77	0.72	99	0.2	-0.2	68	113	84	67
573	105.524	0.184	0.070	0.41	77	0.67	99	0.6	0.4	68	113	84	67
574	105.708	0.184	0.070	0.41	77	1.38	99	0.4	-0.2	68	113	84	67
575	105.893	0.185	0.070	0.41	77	0.11	100	0.4	0	68	112	84	67
576	106.077	0.184	0.070	0.41	77	0.34	99	0.5	0.1	68	112	84	67
577	106.261	0.184	0.070	0.41	77	0.4	99	0.4	-0.1	68	112	84	67
578	106.445	0.184	0.070	0.42	77	1	99	0.4	0	68	111	84	67
579	106.629	0.184	0.070	0.41	77	0.83	99	0.0	-0.4	68	111	84	67
580	106.813	0.184	0.070	0.42	77	1.39	99	0.7	0.7	68	111	84	67
581	106.998	0.185	0.070	0.41	77	1.35	100	0.5	-0.2	68	111	84	67
582	107.182	0.184	0.070	0.41	77	0.04	99	0.4	-0.1	68	111	84	67
583	107.366	0.184	0.070	0.41	77	0.51	99	0.4	0	68	111	84	67
584	107.550	0.184	0.070	0.41	77	0.12	99	0.4	0	68	111	84	67
585	107.734	0.184	0.070	0.41	77	0.54	99	0.3	-0.1	68	111	84	67
586	107.918	0.184	0.070	0.41	77	0.86	99	0.3	0	68	110	84	67
587	108.103	0.185	0.070	0.41	77	0.44	100	0.3	0	68	110	84	67
588	108.287	0.184	0.070	0.41	77	1.19	99	0.4	0.1	68	110	84	67
589	108.471	0.184	0.070	0.41	77	0.17	99	0.4	0	68	110	84	67
590	108.655	0.184	0.070	0.42	77	0.23	99	0.3	-0.1	68	110	84	67
591	108.839	0.184	0.070	0.41	77	1.31	99	0.5	0.2	68	109	84	67
592	109.023	0.184	0.070	0.42	77	0.71	99	0.4	-0.1	68	109	84	67
593	109.208	0.185	0.070	0.41	77	1.41	100	0.3	-0.1	68	109	84	67

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 4

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/11/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
594	109.392	0.184	0.070	0.41	77	0.55	99	0.4	0.1	68	108	83	67
595	109.576	0.184	0.070	0.41	77	0.35	99	0.3	-0.1	68	108	84	67
596	109.760	0.184	0.070	0.41	77	1.19	99	0.4	0.1	68	108	83	67
597	109.944	0.184	0.070	0.42	77	0.99	99	0.3	-0.1	68	108	84	67
598	110.128	0.184	0.070	0.41	77	1.41	99	0.3	0	68	107	84	67
599	110.313	0.185	0.070	0.41	77	0.45	100	0.3	0	68	107	84	67
600	110.497	0.184	0.070	0.42	77	1.35	99	0.3	0	68	107	84	67
601	110.681	0.184	0.070	0.41	77	0.29	99	0.3	0	68	107	84	67
602	110.865	0.184	0.070	0.42	77	0.43	99	0.2	-0.1	68	107	84	67
603	111.049	0.184	0.070	0.41	77	1.24	99	0.3	0.1	68	106	84	67
604	111.233	0.184	0.070	0.41	77	0.72	99	0.3	0	67	106	84	67
605	111.417	0.184	0.070	0.41	77	0.47	99	0.2	-0.1	67	106	84	67
606	111.602	0.185	0.070	0.42	77	0.39	99	0.3	0.1	67	105	84	66
607	111.786	0.184	0.070	0.41	77	0.22	99	0.3	0	67	105	84	67
608	111.970	0.184	0.070	0.42	77	0.12	99	0.3	0	67	105	84	67
609	112.154	0.184	0.070	0.41	77	0.44	99	0.3	0	67	105	83	67
610	112.338	0.184	0.070	0.42	77	0.43	99	0.2	-0.1	67	104	84	67
611	112.522	0.184	0.070	0.41	77	1.4	99	0.2	0	67	104	84	67
612	112.707	0.185	0.070	0.41	77	0.7	99	0.3	0.1	67	104	84	67
613	112.891	0.184	0.070	0.41	77	1.23	99	0.2	-0.1	67	103	84	66
614	113.075	0.184	0.070	0.41	77	0.2	99	0.2	0	67	103	84	66
615	113.259	0.184	0.070	0.41	77	0.49	99	0.2	0	67	103	84	66
616	113.443	0.184	0.070	0.41	77	1.4	99	0.2	0	67	103	84	67
617	113.627	0.184	0.070	0.41	77	1.24	99	0.2	0	67	103	84	66
618	113.812	0.185	0.070	0.42	77	1.43	99	0.2	0	67	102	84	67
619	113.996	0.184	0.070	0.41	77	0.44	99	0.2	0	67	102	84	66
620	114.180	0.184	0.070	0.42	77	0.23	99	0.2	0	67	102	84	66
621	114.364	0.184	0.070	0.41	77	1.31	99	0.1	-0.1	67	102	84	66
622	114.548	0.184	0.070	0.41	77	0.61	99	0.2	0.1	67	102	84	67
623	114.732	0.184	0.070	0.41	77	1.01	99	0.3	0.1	67	101	84	66
624	114.917	0.185	0.070	0.41	77	0.22	99	0.2	-0.1	67	102	84	66
625	115.101	0.184	0.070	0.41	77	0.52	99	0.2	0	67	101	84	66
626	115.285	0.184	0.070	0.41	77	0.71	99	0.2	0	67	101	84	66

BOX A TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 4

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/11/2019

	Particulate Sampling Data							Fuel Weight (lb)		Temperature Data (°F)			
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Dilution Tunnel dP (in H_2O)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Scale Reading	Weight Change	Dilution Tunnel	Flue	Filter	Ambient
627	115.469	0.184	0.070	0.41	77	1.33	99	0.2	0	67	101	84	66
628	115.653	0.184	0.070	0.41	77	0.46	99	0.2	0	67	100	84	66
629	115.837	0.184	0.070	0.41	77	1.41	99	0.2	0	67	100	84	66
630	116.022	0.185	0.070	0.41	77	0.34	99	0.1	-0.1	67	100	84	66
631	116.206	0.184	0.070	0.42	77	0.44	99	0.1	0	67	101	84	66
632	116.390	0.184	0.070	0.41	77	0.85	99	0.1	0	67	101	84	66
633	116.574	0.184	0.070	0.41	77	0.74	99	0.0	-0.1	67	100	84	66
Avg/Tot	116.574	0.184	0.070	0.40	78	0.77	100			80	198	84	70.6

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 4

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/11/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
0	0.000		0.00	71	1		82	0.000	4.78	0.27
1	0.178	0.178	0.43	72	2.24	103	82	-0.050	2.93	0.22
2	0.357	0.179	0.41	72	0.74	103	82	-0.050	1.03	0.34
3	0.535	0.178	0.42	72	2.34	102	82	-0.060	1.52	0.59
4	0.714	0.179	0.41	71	2.41	103	82	-0.060	3.92	0.77
5	0.892	0.178	0.41	71	0.2	103	83	-0.080	6.40	0.59
6	1.071	0.179	0.40	71	1.06	104	83	-0.080	7.77	0.38
7	1.249	0.178	0.40	71	1.64	104	84	-0.080	8.86	0.26
8	1.428	0.179	0.40	71	2.36	105	85	-0.080	9.70	0.19
9	1.606	0.178	0.40	71	2.23	105	85	-0.090	10.52	0.10
10	1.785	0.179	0.41	71	2.59	106	86	-0.090	10.97	0.10
11	1.963	0.178	0.39	71	3.05	106	86	-0.090	12.19	0.42
12	2.142	0.179	0.38	71	4.3	107	86	-0.090	12.61	0.42
13	2.320	0.178	0.52	71	1.46	106	83	-0.090	12.79	0.44
14	2.499	0.179	0.40	71	2.38	107	85	-0.090	12.96	0.70
15	2.677	0.178	0.39	71	2.37	107	86	-0.080	13.12	1.38
16	2.856	0.179	0.39	71	1.65	106	85	-0.080	13.25	1.58
17	3.034	0.178	0.39	71	2.4	105	85	-0.080	12.99	1.48
18	3.212	0.178	0.40	71	1.19	105	84	-0.080	13.09	1.26
19	3.391	0.179	0.40	71	1.01	105	83	-0.080	12.55	2.47
20	3.569	0.178	0.40	71	1.19	104	83	-0.080	11.62	0.27
21	3.748	0.179	0.40	71	1.48	105	83	-0.080	10.57	0.14
22	3.926	0.178	0.41	71	1.52	104	83	-0.070	10.18	0.18
23	4.105	0.179	0.42	71	1.43	105	83	-0.080	10.38	0.28
24	4.283	0.178	0.42	72	1.24	104	83	-0.070	10.64	0.27
25	4.462	0.179	0.42	72	2.64	104	83	-0.070	10.76	0.35
26	4.640	0.178	0.41	72	1.01	104	83	-0.080	10.78	0.41
27	4.819	0.179	0.41	72	2.64	104	83	-0.070	10.64	0.43
28	4.997	0.178	0.41	72	1.23	104	83	-0.070	10.96	0.47
29	5.176	0.179	0.41	72	0.93	104	83	-0.070	11.03	0.50
30	5.354	0.178	0.41	72	1.33	104	83	-0.080	11.22	0.53
31	5.533	0.179	0.41	72	0.61	104	83	-0.080	11.25	0.62

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 4

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/11/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
32	5.711	0.178	0.41	72	0.39	104	83	-0.070	11.21	0.57
33	5.890	0.179	0.42	72	0.37	104	83	-0.070	11.28	0.58
34	6.068	0.178	0.42	72	2.6	104	83	-0.080	11.25	0.57
35	6.246	0.178	0.41	72	2.6	103	83	-0.080	11.22	0.55
36	6.425	0.179	0.41	72	1.39	104	83	-0.070	11.16	0.54
37	6.603	0.178	0.41	72	2.01	103	83	-0.080	11.08	0.59
38	6.782	0.179	0.41	73	1.4	104	83	-0.070	10.76	0.71
39	6.960	0.178	0.41	73	0.66	103	83	-0.070	10.61	0.67
40	7.139	0.179	0.41	73	0.39	104	83	-0.070	10.76	0.66
41	7.317	0.178	0.41	73	0.59	103	83	-0.070	10.76	0.68
42	7.496	0.179	0.41	73	1.06	104	83	-0.070	10.66	0.71
43	7.674	0.178	0.41	73	1.02	103	83	-0.070	10.76	0.62
44	7.853	0.179	0.41	73	1.46	104	83	-0.080	10.74	0.69
45	8.031	0.178	0.41	73	1.31	103	83	-0.070	10.70	0.62
46	8.210	0.179	0.41	73	2.66	104	83	-0.080	10.72	0.69
47	8.388	0.178	0.40	73	0.58	103	83	-0.080	10.83	0.69
48	8.567	0.179	0.40	73	2.71	104	83	-0.070	10.73	0.69
49	8.745	0.178	0.41	73	2.1	103	83	-0.070	10.75	0.69
50	8.924	0.179	0.41	73	0.71	104	83	-0.070	10.68	0.67
51	9.102	0.178	0.40	73	1.55	103	83	-0.070	10.62	0.70
52	9.280	0.178	0.41	73	2.71	103	83	-0.070	10.67	0.73
53	9.459	0.179	0.41	74	2.44	103	83	-0.070	10.53	0.72
54	9.637	0.178	0.41	74	0.49	103	83	-0.060	10.60	0.69
55	9.816	0.179	0.41	74	1.39	103	83	-0.070	10.54	0.71
56	9.994	0.178	0.42	74	1.37	103	83	-0.070	10.45	0.69
57	10.173	0.179	0.41	74	2.48	103	82	-0.070	10.48	0.74
58	10.351	0.178	0.41	74	1.28	103	82	-0.070	10.60	0.69
59	10.530	0.179	0.41	74	1.23	103	83	-0.070	10.39	0.60
60	10.708	0.178	0.40	74	2.67	103	82	-0.070	10.30	0.51
61	10.887	0.179	0.40	74	0.5	103	82	-0.070	10.25	0.32
62	11.065	0.178	0.40	74	2.1	103	82	-0.070	10.22	0.30
63	11.244	0.179	0.41	74	0.82	103	82	-0.060	10.14	0.26

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 4

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/11/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
64	11.422	0.178	0.41	74	1.76	103	82	-0.070	10.03	0.24
65	11.601	0.179	0.41	74	1.34	103	82	-0.070	9.91	0.22
66	11.779	0.178	0.40	74	0.73	102	82	-0.070	9.88	0.21
67	11.958	0.179	0.40	74	1.92	103	82	-0.070	9.86	0.18
68	12.136	0.178	0.41	74	1.67	102	82	-0.070	9.71	0.15
69	12.314	0.178	0.41	74	2.65	102	82	-0.070	9.84	0.17
70	12.493	0.179	0.41	74	1.04	103	82	-0.060	9.72	0.17
71	12.671	0.178	0.40	75	1.46	102	82	-0.070	9.68	0.14
72	12.850	0.179	0.40	75	1.77	103	82	-0.060	9.62	0.15
73	13.028	0.178	0.42	75	2.39	102	82	-0.060	9.78	0.13
74	13.207	0.179	0.40	75	2.67	103	82	-0.070	9.57	0.13
75	13.385	0.178	0.40	75	0.89	102	82	-0.070	9.53	0.15
76	13.564	0.179	0.41	75	0.96	103	82	-0.070	9.34	0.12
77	13.742	0.178	0.41	75	1.5	102	82	-0.070	9.16	0.23
78	13.921	0.179	0.40	75	1.49	103	82	-0.060	9.25	0.25
79	14.099	0.178	0.40	75	0.48	102	81	-0.060	9.11	0.24
80	14.278	0.179	0.41	75	1.79	102	81	-0.070	9.07	0.23
81	14.456	0.178	0.41	75	0.6	102	81	-0.070	8.94	0.20
82	14.635	0.179	0.41	75	0.5	102	81	-0.070	8.80	0.24
83	14.813	0.178	0.41	75	1	102	81	-0.060	8.58	0.21
84	14.992	0.179	0.41	75	1.3	102	82	-0.060	8.55	0.14
85	15.170	0.178	0.40	75	0.48	102	82	-0.070	8.56	0.15
86	15.348	0.178	0.40	75	2.42	102	83	-0.060	8.46	0.16
87	15.527	0.179	0.41	75	2.23	102	83	-0.060	8.42	0.17
88	15.705	0.178	0.41	75	1.36	102	83	-0.060	8.35	0.11
89	15.884	0.179	0.41	75	1.42	102	84	-0.060	8.11	0.16
90	16.062	0.178	0.41	75	1.63	102	84	-0.060	8.05	0.15
91	16.241	0.179	0.41	75	1.14	102	84	-0.050	7.90	0.17
92	16.419	0.178	0.41	75	2.17	102	84	-0.060	7.91	0.18
93	16.598	0.179	0.41	75	1.08	102	84	-0.060	7.90	0.19
94	16.776	0.178	0.41	75	1.51	102	84	-0.060	7.92	0.21
95	16.955	0.179	0.41	75	2.56	102	84	-0.060	7.85	0.21

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 4

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/11/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
96	17.133	0.178	0.41	75	1.23	102	84	-0.050	7.77	0.21
97	17.312	0.179	0.41	75	2.63	102	84	-0.060	7.90	0.23
98	17.490	0.178	0.41	75	1.31	101	84	-0.050	7.80	0.23
99	17.669	0.179	0.41	75	1.5	102	84	-0.060	7.81	0.25
100	17.847	0.178	0.40	75	1.43	101	84	-0.060	7.89	0.21
101	18.026	0.179	0.40	75	2.55	102	84	-0.050	7.76	0.18
102	18.204	0.178	0.40	75	2.31	101	84	-0.060	7.79	0.22
103	18.382	0.178	0.41	75	2.62	101	84	-0.060	7.80	0.21
104	18.561	0.179	0.40	75	1.43	102	84	-0.070	7.82	0.24
105	18.739	0.178	0.40	75	2.44	101	84	-0.060	7.90	0.23
106	18.918	0.179	0.40	75	1	102	85	-0.060	7.82	0.21
107	19.096	0.178	0.41	75	2.69	101	85	-0.060	7.80	0.23
108	19.275	0.179	0.41	75	1.12	102	85	-0.060	7.90	0.21
109	19.453	0.178	0.40	75	1.46	101	85	-0.060	8.12	0.17
110	19.632	0.179	0.41	76	1.37	102	85	-0.060	7.82	0.30
111	19.810	0.178	0.40	76	1.7	101	85	-0.060	7.57	0.38
112	19.989	0.179	0.41	76	1.77	102	84	-0.060	7.69	0.36
113	20.167	0.178	0.41	76	1.27	101	85	-0.050	7.75	0.33
114	20.346	0.179	0.41	76	0.87	101	84	-0.060	7.53	0.37
115	20.524	0.178	0.40	76	1.01	101	84	-0.050	7.28	0.45
116	20.703	0.179	0.40	76	1.81	101	84	-0.050	6.96	0.38
117	20.881	0.178	0.40	76	2.45	101	84	-0.050	6.69	0.40
118	21.060	0.179	0.41	76	1.48	101	84	-0.050	6.11	0.42
119	21.238	0.178	0.40	76	1.07	101	84	-0.060	5.54	0.46
120	21.416	0.178	0.41	76	2.68	101	84	-0.050	5.41	0.44
121	21.595	0.179	0.41	76	2.52	101	84	-0.050	5.36	0.45
122	21.773	0.178	0.40	76	2.79	101	84	-0.050	5.09	0.55
123	21.952	0.179	0.41	76	2.62	101	84	-0.050	5.03	0.56
124	22.130	0.178	0.41	76	1.45	100	84	-0.050	4.89	0.57
125	22.309	0.179	0.40	76	2.26	101	84	-0.050	4.81	0.57
126	22.487	0.178	0.41	76	1.19	100	84	-0.050	4.72	0.55
127	22.666	0.179	0.41	76	2.34	101	84	-0.050	4.62	0.58

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 4

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/11/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
128	22.844	0.178	0.41	76	0.85	100	84	-0.060	4.75	0.55
129	23.023	0.179	0.40	76	2.7	101	84	-0.050	4.70	0.57
130	23.201	0.178	0.40	76	1.08	100	84	-0.050	4.62	0.56
131	23.380	0.179	0.40	76	1.29	101	84	-0.040	4.61	0.59
132	23.558	0.178	0.40	76	1.67	100	84	-0.050	4.62	0.58
133	23.737	0.179	0.40	76	2.73	101	84	-0.040	4.57	0.53
134	23.915	0.178	0.40	76	2.77	100	84	-0.040	4.46	0.57
135	24.094	0.179	0.39	76	1.48	101	84	-0.040	4.35	0.57
136	24.272	0.178	0.40	76	1.63	100	85	-0.040	4.42	0.53
137	24.450	0.178	0.39	76	2.81	100	87	-0.050	4.47	0.54
138	24.629	0.179	0.39	76	1.43	101	88	-0.040	4.35	0.57
139	24.807	0.178	0.38	76	1.28	100	89	-0.040	4.31	0.54
140	24.986	0.179	0.41	76	1.89	101	89	-0.040	4.25	0.57
141	25.164	0.178	0.40	76	1.82	100	89	-0.040	4.26	0.58
142	25.343	0.179	0.40	76	1.26	101	88	-0.040	4.30	0.58
143	25.521	0.178	0.39	76	3.06	100	86	-0.050	4.32	0.56
144	25.700	0.179	0.39	76	1.77	101	85	-0.040	4.09	0.54
145	25.878	0.178	0.42	76	3.02	100	84	-0.040	4.12	0.54
146	26.057	0.179	0.41	76	2.83	100	82	-0.040	3.97	0.65
147	26.235	0.178	0.41	76	1.18	100	81	-0.050	3.87	0.73
148	26.414	0.179	0.40	76	3.44	100	81	-0.040	3.71	0.73
149	26.592	0.178	0.40	76	2.16	100	81	-0.040	3.70	0.68
150	26.771	0.179	0.40	76	1.81	100	83	-0.040	3.62	0.70
151	26.949	0.178	0.40	76	3.63	100	84	-0.040	3.51	0.69
152	27.128	0.179	0.41	76	3.41	100	85	-0.040	3.48	0.70
153	27.306	0.178	0.40	76	4.15	100	86	-0.050	3.49	0.68
154	27.484	0.178	0.39	76	2.27	100	86	-0.040	3.46	0.69
155	27.663	0.179	0.40	76	4.45	100	87	-0.040	3.45	0.66
156	27.841	0.178	0.38	76	3.97	100	87	-0.040	3.37	0.68
157	28.020	0.179	0.53	76	0.84	100	86	-0.040	3.39	0.71
158	28.198	0.178	0.41	76	1.06	100	84	-0.050	3.39	0.70
159	28.377	0.179	0.40	76	2.18	100	83	-0.040	3.36	0.67

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Job #: 19-468
Model: ST210GL
Tracking #: 0026
Run #: 4
Technician: SJB
Date: 4/11/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
160	28.555	0.178	0.40	76	1.05	100	82	-0.040	3.35	0.69
161	28.734	0.179	0.39	76	1.05	100	82	-0.040	3.40	0.66
162	28.912	0.178	0.40	76	1.78	100	82	-0.040	3.34	0.68
163	29.091	0.179	0.40	76	0.15	100	82	-0.040	3.30	0.68
164	29.269	0.178	0.40	76	2.25	100	82	-0.040	3.35	0.66
165	29.448	0.179	0.40	76	1.45	100	83	-0.040	3.31	0.67
166	29.626	0.178	0.41	76	2.35	100	83	-0.040	3.31	0.66
167	29.805	0.179	0.40	76	1.31	100	84	-0.030	3.22	0.65
168	29.983	0.178	0.40	76	2.46	100	85	-0.040	3.35	0.59
169	30.162	0.179	0.40	76	0.22	100	86	-0.040	3.25	0.61
170	30.340	0.178	0.41	76	1.32	100	86	-0.040	3.26	0.60
171	30.519	0.179	0.40	76	2.45	100	87	-0.040	3.19	0.62
172	30.697	0.178	0.40	76	2.29	100	88	-0.030	3.19	0.62
173	30.875	0.178	0.40	76	2.35	100	87	-0.040	3.24	0.62
174	31.054	0.179	0.40	76	2.25	100	86	-0.040	3.28	0.62
175	31.232	0.178	0.40	76	1.27	100	86	-0.040	3.24	0.61
176	31.411	0.179	0.40	76	1.08	100	87	-0.040	3.13	0.62
177	31.589	0.178	0.40	76	2.19	100	87	-0.040	3.11	0.63
178	31.768	0.179	0.40	76	1.12	100	87	-0.040	3.08	0.62
179	31.946	0.178	0.39	76	0.6	100	87	-0.040	2.99	0.65
180	32.125	0.179	0.39	76	0.66	100	88	-0.030	3.10	0.60
181	32.303	0.178	0.39	76	1.18	100	87	-0.040	2.91	0.63
182	32.482	0.179	0.39	76	2.13	100	86	-0.040	3.08	0.62
183	32.660	0.178	0.39	76	1.18	100	86	-0.040	3.05	0.61
184	32.839	0.179	0.40	76	1.52	100	86	-0.040	3.02	0.60
185	33.017	0.178	0.40	76	1.29	100	86	-0.040	3.02	0.61
186	33.196	0.179	0.39	76	0.86	100	86	-0.040	2.89	0.61
187	33.374	0.178	0.38	76	0.96	100	86	-0.040	2.89	0.62
188	33.553	0.179	0.39	76	2.51	100	86	-0.040	2.95	0.59
189	33.731	0.178	0.41	76	0.78	100	86	-0.030	2.87	0.60
190	33.909	0.178	0.41	76	1.46	100	86	-0.040	2.86	0.61
191	34.088	0.179	0.40	76	1.03	100	86	-0.040	2.98	0.58

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Job #: 19-468
Model: ST210GL
Tracking #: 0026
Run #: 4
Technician: SJB
Date: 4/11/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
192	34.266	0.178	0.40	76	1.17	100	86	-0.040	2.83	0.60
193	34.445	0.179	0.40	76	2.72	100	86	-0.040	2.81	0.61
194	34.623	0.178	0.39	76	1.68	100	86	-0.040	2.85	0.61
195	34.802	0.179	0.42	76	1.63	100	86	-0.040	2.93	0.59
196	34.980	0.178	0.41	76	2.61	100	86	-0.030	2.73	0.59
197	35.159	0.179	0.41	76	3.16	100	86	-0.040	2.79	0.61
198	35.337	0.178	0.41	76	3.04	100	86	-0.030	2.83	0.56
199	35.516	0.179	0.42	76	2.72	100	86	-0.040	2.88	0.61
200	35.694	0.178	0.41	75	1.55	100	86	-0.030	2.88	0.60
201	35.873	0.179	0.41	75	2.91	100	86	-0.030	2.85	0.60
202	36.051	0.178	0.41	75	1.16	100	86	-0.030	2.82	0.61
203	36.230	0.179	0.41	75	2.37	100	86	-0.030	2.72	0.64
204	36.408	0.178	0.41	76	1.88	99	86	-0.030	2.82	0.60
205	36.587	0.179	0.41	76	0.96	100	86	-0.030	2.69	0.65
206	36.765	0.178	0.41	75	2.43	100	86	-0.030	2.76	0.65
207	36.943	0.178	0.40	76	3.11	99	86	-0.030	2.70	0.67
208	37.122	0.179	0.41	75	3.1	100	86	-0.020	2.64	0.66
209	37.300	0.178	0.41	76	2.89	99	86	-0.030	2.81	0.65
210	37.479	0.179	0.41	76	1.78	100	86	-0.030	2.86	0.65
211	37.657	0.178	0.41	76	1.52	99	86	-0.020	2.65	0.66
212	37.836	0.179	0.41	76	2.14	100	86	-0.030	2.74	0.68
213	38.014	0.178	0.41	76	1.04	99	86	-0.030	2.78	0.66
214	38.193	0.179	0.42	76	2.16	100	86	-0.020	2.79	0.66
215	38.371	0.178	0.42	76	1.74	99	86	-0.020	2.73	0.68
216	38.550	0.179	0.42	76	1.24	100	86	-0.020	2.70	0.69
217	38.728	0.178	0.42	76	2.17	99	86	-0.030	2.74	0.69
218	38.907	0.179	0.42	76	3.09	100	86	-0.020	2.78	0.69
219	39.085	0.178	0.42	76	1.42	99	86	-0.030	2.71	0.70
220	39.264	0.179	0.41	76	2.23	100	86	-0.030	2.70	0.70
221	39.442	0.178	0.42	76	3.04	99	86	-0.020	2.71	0.71
222	39.621	0.179	0.42	76	1.71	100	86	-0.030	2.77	0.73
223	39.799	0.178	0.41	76	3.01	99	85	-0.030	2.74	0.73

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 4

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/11/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
224	39.977	0.178	0.42	76	0.8	99	86	-0.020	2.84	0.70
225	40.156	0.179	0.41	76	1.51	100	85	-0.020	2.75	0.72
226	40.334	0.178	0.42	76	1.84	99	86	-0.030	2.81	0.68
227	40.513	0.179	0.43	76	2.52	100	85	-0.030	2.73	0.72
228	40.691	0.178	0.42	76	2.94	99	85	-0.030	2.73	0.71
229	40.870	0.179	0.41	76	2.97	100	85	-0.020	2.76	0.67
230	41.048	0.178	0.42	76	2.7	99	85	-0.030	2.85	0.64
231	41.227	0.179	0.41	76	3.03	100	85	-0.030	2.81	0.63
232	41.405	0.178	0.42	76	2.74	99	85	-0.020	2.93	0.64
233	41.584	0.179	0.42	76	1.66	100	85	-0.030	2.85	0.69
234	41.762	0.178	0.42	76	1.89	99	85	-0.030	2.76	0.67
235	41.941	0.179	0.42	76	2.27	100	85	-0.020	2.88	0.63
236	42.119	0.178	0.42	76	2.33	99	85	-0.020	2.76	0.65
237	42.298	0.179	0.42	76	2.89	100	85	-0.030	2.83	0.62
238	42.476	0.178	0.41	76	0.78	99	85	-0.020	2.74	0.60
239	42.655	0.179	0.42	76	2.97	100	85	-0.020	2.76	0.56
240	42.833	0.178	0.42	76	3.08	99	85	-0.020	2.73	0.58
241	43.011	0.178	0.41	76	1.56	99	85	-0.020	2.70	0.53
242	43.190	0.179	0.41	76	2.96	99	85	-0.030	2.62	0.54
243	43.368	0.178	0.42	76	2.86	99	85	-0.020	2.68	0.51
244	43.547	0.179	0.40	76	1.69	99	85	-0.020	2.54	0.51
245	43.725	0.178	0.41	76	1.68	99	85	-0.020	2.57	0.53
246	43.904	0.179	0.41	76	2.7	99	85	-0.020	2.72	0.50
247	44.082	0.178	0.41	76	2.97	99	85	-0.020	2.65	0.51
248	44.261	0.179	0.42	76	1.61	99	85	-0.020	2.61	0.51
249	44.439	0.178	0.41	76	0.9	99	85	-0.030	2.55	0.57
250	44.618	0.179	0.41	76	1.92	99	85	-0.030	2.51	0.56
251	44.796	0.178	0.41	76	2.97	99	85	-0.030	2.53	0.55
252	44.975	0.179	0.41	76	1.61	99	85	-0.020	2.52	0.56
253	45.153	0.178	0.42	76	2.6	99	85	-0.020	2.63	0.52
254	45.332	0.179	0.42	76	2.43	99	85	-0.030	2.70	0.54
255	45.510	0.178	0.41	76	1.54	99	85	-0.030	2.81	0.51

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 4

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/11/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
256	45.689	0.179	0.41	76	2.87	99	85	-0.020	2.68	0.54
257	45.867	0.178	0.42	76	1.4	99	85	-0.020	2.75	0.53
258	46.045	0.178	0.42	76	1.39	99	85	-0.020	2.92	0.53
259	46.224	0.179	0.41	76	1.5	99	85	-0.020	2.96	0.49
260	46.402	0.178	0.42	76	2.2	99	85	-0.030	2.92	0.52
261	46.581	0.179	0.42	76	2.87	99	85	-0.020	2.85	0.53
262	46.759	0.178	0.41	76	1.62	99	85	-0.030	2.96	0.49
263	46.938	0.179	0.41	76	2.28	99	85	-0.020	3.01	0.50
264	47.116	0.178	0.42	76	2.61	99	85	-0.020	3.27	0.51
265	47.295	0.179	0.42	76	2.68	99	85	-0.020	3.43	0.51
266	47.473	0.178	0.42	76	2.75	99	85	-0.030	3.40	0.52
267	47.652	0.179	0.42	76	2.8	99	85	-0.020	3.54	0.55
268	47.830	0.178	0.42	76	1.92	99	85	-0.030	3.47	0.57
269	48.009	0.179	0.42	76	1.55	99	85	-0.020	3.56	0.55
270	48.187	0.178	0.42	76	2.82	99	85	-0.030	3.59	0.56
271	48.366	0.179	0.42	76	1.23	99	85	-0.020	3.66	0.53
272	48.544	0.178	0.42	76	1.33	99	85	-0.030	3.70	0.52
273	48.723	0.179	0.42	76	2.06	99	85	-0.030	3.60	0.65
274	48.901	0.178	0.42	76	0.64	99	85	-0.030	3.61	0.64
275	49.079	0.178	0.42	76	1.76	99	85	-0.020	3.55	0.67
276	49.258	0.179	0.41	76	1.61	99	85	-0.020	3.62	0.64
277	49.436	0.178	0.42	76	2.83	99	85	-0.020	3.59	0.68
278	49.615	0.179	0.42	76	2.55	99	85	-0.020	3.59	0.61
279	49.793	0.178	0.42	76	2.33	99	85	-0.020	3.62	0.66
280	49.972	0.179	0.42	76	1.25	99	85	-0.020	3.55	0.66
281	50.150	0.178	0.42	76	2.71	99	85	-0.020	3.62	0.65
282	50.329	0.179	0.42	76	1.59	99	86	-0.020	3.63	0.65
283	50.507	0.178	0.42	76	2.91	99	87	-0.020	3.66	0.61
284	50.686	0.179	0.41	76	1.57	99	88	-0.020	3.65	0.64
285	50.864	0.178	0.42	76	0.66	99	88	-0.020	3.62	0.66
286	51.043	0.179	0.42	76	2.31	99	89	-0.020	3.52	0.67
287	51.221	0.178	0.43	76	1.44	99	89	-0.020	3.43	0.68

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 4

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/11/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
288	51.400	0.179	0.42	76	1.6	99	89	-0.030	3.52	0.71
289	51.578	0.178	0.42	76	1.71	99	89	-0.020	3.58	0.68
290	51.757	0.179	0.42	76	1.22	99	89	-0.020	3.45	0.68
291	51.935	0.178	0.42	76	2.23	99	89	-0.020	3.51	0.65
292	52.113	0.178	0.41	76	1.46	99	88	-0.020	3.45	0.69
293	52.292	0.179	0.43	76	2.75	99	87	-0.020	3.52	0.66
294	52.470	0.178	0.43	76	1.91	99	88	-0.020	3.53	0.68
295	52.649	0.179	0.42	76	2.89	99	88	-0.020	3.46	0.69
296	52.827	0.178	0.42	76	2.64	99	88	-0.020	3.50	0.68
297	53.006	0.179	0.42	76	1.81	99	88	-0.020	3.56	0.68
298	53.184	0.178	0.42	76	2.85	99	88	-0.020	3.56	0.67
299	53.363	0.179	0.43	76	1.6	99	88	-0.020	3.55	0.71
300	53.541	0.178	0.42	76	1.55	99	88	-0.020	3.60	0.68
301	53.720	0.179	0.42	76	1.53	99	88	-0.010	3.41	0.70
302	53.898	0.178	0.42	76	0.62	99	88	-0.020	3.46	0.71
303	54.077	0.179	0.42	76	0.62	99	88	-0.020	3.57	0.72
304	54.255	0.178	0.43	76	2.62	99	88	-0.020	3.66	0.69
305	54.434	0.179	0.43	76	2.36	99	88	-0.020	3.62	0.68
306	54.612	0.178	0.42	76	2.12	99	88	-0.020	3.55	0.70
307	54.791	0.179	0.42	76	1.83	99	88	-0.030	3.69	0.67
308	54.969	0.178	0.43	76	2.76	99	88	-0.020	3.66	0.68
309	55.147	0.178	0.43	76	2.25	99	88	-0.020	3.66	0.68
310	55.326	0.179	0.42	76	2.8	99	88	-0.020	3.59	0.67
311	55.504	0.178	0.43	76	2.84	99	88	-0.020	3.59	0.67
312	55.683	0.179	0.42	76	2.37	99	88	-0.020	3.55	0.68
313	55.861	0.178	0.42	76	1.02	99	88	-0.030	3.62	0.69
314	56.040	0.179	0.42	76	1.83	99	88	-0.020	3.57	0.69
315	56.218	0.178	0.40	76	1.27	99	88	-0.020	3.60	0.71
316	56.397	0.179	0.41	76	2.69	99	88	-0.020	3.72	0.67
317	56.575	0.178	0.40	76	2.15	99	88	-0.020	3.63	0.68
318	56.754	0.179	0.41	76	0.49	99	88	-0.020	3.70	0.68
319	56.932	0.178	0.41	76	0.49	99	88	-0.020	3.70	0.69

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 4

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/11/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
320	57.111	0.179	0.40	76	2.76	99	88	-0.020	3.64	0.69
321	57.289	0.178	0.41	76	2.72	99	88	-0.020	3.62	0.68
322	57.468	0.179	0.41	76	0.61	99	88	-0.020	3.76	0.67
323	57.646	0.178	0.40	76	2.6	99	88	-0.020	3.65	0.69
324	57.825	0.179	0.40	76	2.73	99	88	-0.030	3.70	0.70
325	58.003	0.178	0.40	76	2.56	99	88	-0.020	3.68	0.66
326	58.181	0.178	0.41	76	1.67	99	88	-0.020	3.78	0.70
327	58.360	0.179	0.41	76	2.63	99	89	-0.020	3.68	0.68
328	58.538	0.178	0.41	76	1.91	99	89	-0.020	3.76	0.67
329	58.717	0.179	0.41	76	2.26	99	89	-0.020	3.71	0.68
330	58.895	0.178	0.40	75	1.45	99	88	-0.020	3.67	0.69
331	59.074	0.179	0.40	76	1.51	99	88	-0.020	3.66	0.76
332	59.252	0.178	0.41	75	2.74	99	88	-0.020	3.65	0.70
333	59.431	0.179	0.40	75	2.47	99	88	-0.020	3.60	0.73
334	59.609	0.178	0.41	75	2.37	99	88	-0.020	3.66	0.70
335	59.788	0.179	0.41	75	1.21	99	88	-0.020	3.78	0.72
336	59.966	0.178	0.40	75	1.91	99	87	-0.020	3.64	0.72
337	60.145	0.179	0.41	75	0.69	99	87	-0.030	3.67	0.71
338	60.323	0.178	0.40	75	1.48	99	87	-0.020	3.66	0.70
339	60.502	0.179	0.40	75	1.4	99	87	-0.020	3.55	0.69
340	60.680	0.178	0.40	75	0.7	99	87	-0.030	3.71	0.70
341	60.859	0.179	0.40	75	1.42	99	87	-0.030	3.61	0.70
342	61.037	0.178	0.41	75	1.4	99	87	-0.020	3.70	0.67
343	61.215	0.178	0.41	75	2.13	99	87	-0.020	3.56	0.71
344	61.394	0.179	0.41	75	0.82	99	87	-0.030	3.57	0.71
345	61.572	0.178	0.41	75	2.69	99	87	-0.020	3.56	0.67
346	61.751	0.179	0.41	75	1.3	99	87	-0.020	3.66	0.68
347	61.929	0.178	0.40	75	1.05	99	87	-0.030	3.64	0.70
348	62.108	0.179	0.40	75	1.74	99	87	-0.020	3.64	0.69
349	62.286	0.178	0.41	75	2.6	99	87	-0.020	3.59	0.72
350	62.465	0.179	0.40	75	0.44	99	87	-0.030	3.64	0.72
351	62.643	0.178	0.40	75	2.64	99	87	-0.020	3.56	0.69

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 4

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/11/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
352	62.822	0.179	0.41	75	1.4	99	87	-0.020	3.70	0.76
353	63.000	0.178	0.42	75	2.59	99	87	-0.020	3.60	0.79
354	63.179	0.179	0.41	75	0.71	99	87	-0.020	3.64	0.79
355	63.357	0.178	0.41	75	2.75	99	87	-0.020	3.56	0.74
356	63.536	0.179	0.40	75	1.29	99	87	-0.020	3.61	0.73
357	63.714	0.178	0.41	75	1.03	99	87	-0.010	3.53	0.73
358	63.893	0.179	0.41	75	0.56	99	87	-0.020	3.58	0.73
359	64.071	0.178	0.41	75	0.52	99	87	-0.020	3.58	0.74
360	64.249	0.178	0.41	75	1.48	99	87	-0.020	3.60	0.69
361	64.428	0.179	0.41	75	2.73	99	87	-0.020	3.58	0.72
362	64.606	0.178	0.41	75	1.15	99	87	-0.030	3.59	0.70
363	64.785	0.179	0.40	75	1.36	99	87	-0.020	3.50	0.69
364	64.963	0.178	0.41	75	2.64	99	87	-0.020	3.58	0.70
365	65.142	0.179	0.40	75	1.85	99	87	-0.020	3.43	0.71
366	65.320	0.178	0.41	75	2.69	99	87	-0.020	3.35	0.73
367	65.499	0.179	0.41	75	1.24	99	87	-0.020	3.50	0.69
368	65.677	0.178	0.41	75	0.99	99	87	-0.020	3.37	0.71
369	65.856	0.179	0.41	75	1.75	99	87	-0.020	3.43	0.71
370	66.034	0.178	0.41	75	1.34	99	87	-0.020	3.53	0.67
371	66.213	0.179	0.41	75	2.53	99	87	-0.030	3.42	0.69
372	66.391	0.178	0.42	75	1.88	99	87	-0.020	3.49	0.66
373	66.570	0.179	0.41	75	2.65	99	87	-0.020	3.47	0.65
374	66.748	0.178	0.42	75	2.39	99	87	-0.020	3.44	0.66
375	66.927	0.179	0.41	75	1.42	99	87	-0.030	3.43	0.68
376	67.105	0.178	0.41	75	2.41	99	87	-0.020	3.31	0.67
377	67.283	0.178	0.41	75	2.09	99	87	-0.010	3.32	0.64
378	67.462	0.179	0.41	75	0.51	99	87	-0.030	3.44	0.70
379	67.640	0.178	0.41	75	0.87	99	87	-0.020	3.46	0.70
380	67.819	0.179	0.41	75	0.82	99	87	-0.030	3.49	0.72
381	67.997	0.178	0.42	75	2.61	99	87	-0.020	3.47	0.69
382	68.176	0.179	0.41	75	0.95	99	87	-0.020	3.45	0.66
383	68.354	0.178	0.41	75	1.4	99	87	-0.020	3.54	0.65

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 4

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/11/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
384	68.533	0.179	0.40	75	1.44	99	87	-0.020	3.37	0.67
385	68.711	0.178	0.41	75	1.36	99	87	-0.020	3.48	0.67
386	68.890	0.179	0.42	75	1.81	99	87	-0.020	3.41	0.66
387	69.068	0.178	0.42	75	2.44	99	87	-0.020	3.42	0.65
388	69.247	0.179	0.41	75	2.58	99	87	-0.020	3.43	0.63
389	69.425	0.178	0.41	75	1.37	99	87	-0.010	3.37	0.65
390	69.604	0.179	0.41	75	1.02	99	87	-0.020	3.37	0.65
391	69.782	0.178	0.42	75	0.56	99	87	-0.020	3.50	0.66
392	69.961	0.179	0.41	75	2.7	99	87	-0.010	3.37	0.65
393	70.139	0.178	0.41	75	0.76	99	87	-0.020	3.47	0.66
394	70.317	0.178	0.41	75	2.62	99	87	-0.010	3.43	0.65
395	70.496	0.179	0.40	75	1.28	99	87	-0.020	3.36	0.66
396	70.674	0.178	0.42	75	2.41	99	87	-0.020	3.52	0.68
397	70.853	0.179	0.42	75	0.86	99	87	-0.020	3.43	0.70
398	71.031	0.178	0.42	75	2.58	99	87	-0.020	3.46	0.71
399	71.210	0.179	0.42	75	2.69	99	86	-0.020	3.55	0.72
400	71.388	0.178	0.41	75	2.72	99	87	-0.020	3.42	0.74
401	71.567	0.179	0.41	75	2.48	99	87	-0.020	3.40	0.74
402	71.745	0.178	0.41	75	0.79	99	87	-0.030	3.43	0.75
403	71.924	0.179	0.41	75	0.91	99	86	-0.020	3.55	0.75
404	72.102	0.178	0.42	75	1.27	99	87	-0.020	3.45	0.72
405	72.281	0.179	0.41	75	1.28	99	87	-0.020	3.45	0.74
406	72.459	0.178	0.42	75	2.63	99	87	-0.020	3.59	0.74
407	72.638	0.179	0.41	75	1.21	99	86	-0.020	3.52	0.76
408	72.816	0.178	0.42	75	2.58	99	87	-0.020	3.62	0.77
409	72.995	0.179	0.41	75	2.45	99	86	-0.020	3.52	0.74
410	73.173	0.178	0.42	75	2.27	99	87	-0.030	3.60	0.78
411	73.351	0.178	0.41	75	2.46	99	87	-0.020	3.44	0.78
412	73.530	0.179	0.41	75	2.47	99	87	-0.020	3.51	0.77
413	73.708	0.178	0.42	75	2.54	99	86	-0.020	3.64	0.79
414	73.887	0.179	0.41	75	1.86	99	87	-0.020	3.53	0.81
415	74.065	0.178	0.41	75	2.62	99	87	-0.020	3.59	0.80

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 4

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/11/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
416	74.244	0.179	0.42	75	1.34	99	87	-0.030	3.57	0.77
417	74.422	0.178	0.41	75	2.64	99	86	-0.020	3.50	0.75
418	74.601	0.179	0.41	75	1.82	99	87	-0.010	3.52	0.75
419	74.779	0.178	0.41	75	1.73	99	86	-0.020	3.50	0.76
420	74.958	0.179	0.42	75	1.54	99	87	-0.020	3.50	0.79
421	75.136	0.178	0.42	75	2.57	99	87	-0.020	3.54	0.76
422	75.315	0.179	0.41	75	2.69	99	87	-0.020	3.59	0.77
423	75.493	0.178	0.41	75	1.32	99	86	-0.020	3.60	0.76
424	75.672	0.179	0.41	75	1.33	99	87	-0.020	3.52	0.78
425	75.850	0.178	0.41	75	0.44	99	86	-0.030	3.51	0.77
426	76.029	0.179	0.42	75	2.43	99	87	-0.020	3.66	0.77
427	76.207	0.178	0.42	75	0.62	99	86	-0.020	3.42	0.75
428	76.385	0.178	0.41	75	1.6	99	86	-0.020	3.47	0.75
429	76.564	0.179	0.41	75	2.58	99	86	-0.020	3.50	0.75
430	76.742	0.178	0.42	75	1.3	99	87	-0.020	3.59	0.71
431	76.921	0.179	0.41	75	2.76	99	86	-0.020	3.52	0.76
432	77.099	0.178	0.42	75	1.9	99	87	-0.020	3.50	0.75
433	77.278	0.179	0.42	75	2.45	99	86	-0.020	3.66	0.72
434	77.456	0.178	0.41	75	2.65	99	86	-0.020	3.56	0.74
435	77.635	0.179	0.42	75	2.46	99	86	-0.020	3.71	0.71
436	77.813	0.178	0.42	75	2.51	99	87	-0.020	3.62	0.73
437	77.992	0.179	0.42	75	2.62	99	86	-0.020	3.62	0.69
438	78.170	0.178	0.41	75	2.59	99	87	-0.020	3.58	0.69
439	78.349	0.179	0.41	75	2.72	99	87	-0.020	3.68	0.70
440	78.527	0.178	0.41	75	1.53	99	86	-0.020	3.79	0.71
441	78.706	0.179	0.41	75	0.64	99	86	-0.020	3.67	0.68
442	78.884	0.178	0.42	75	2.34	99	86	-0.020	3.57	0.66
443	79.063	0.179	0.42	75	2.52	99	86	-0.020	3.72	0.67
444	79.241	0.178	0.41	75	0.98	99	86	-0.020	3.74	0.72
445	79.419	0.178	0.42	75	1.3	99	86	-0.030	3.80	0.66
446	79.598	0.179	0.41	75	1.37	99	86	-0.020	3.80	0.66
447	79.776	0.178	0.42	75	0.55	99	86	-0.020	3.81	0.67

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 4

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/11/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
448	79.955	0.179	0.42	75	1.57	99	86	-0.020	3.82	0.68
449	80.133	0.178	0.42	75	0.78	99	87	-0.020	3.73	0.70
450	80.312	0.179	0.41	75	2.62	99	87	-0.010	3.42	0.70
451	80.490	0.178	0.41	75	0.39	99	87	-0.020	3.58	0.78
452	80.669	0.179	0.42	75	1.81	99	87	-0.030	3.50	0.77
453	80.847	0.178	0.41	74	1.01	99	87	-0.020	3.46	0.76
454	81.026	0.179	0.42	74	2.66	100	86	-0.020	3.44	0.71
455	81.204	0.178	0.41	74	1.32	99	86	-0.020	3.48	0.72
456	81.383	0.179	0.42	74	2.31	100	87	-0.020	3.51	0.72
457	81.561	0.178	0.41	74	2.62	99	86	-0.020	3.37	0.70
458	81.740	0.179	0.42	74	2.61	100	87	-0.010	3.45	0.68
459	81.918	0.178	0.42	74	1.47	99	87	-0.020	3.49	0.68
460	82.097	0.179	0.42	74	2.56	100	87	-0.020	3.48	0.69
461	82.275	0.178	0.41	74	2.61	99	87	-0.010	3.29	0.66
462	82.453	0.178	0.42	74	1.06	99	87	-0.020	3.43	0.66
463	82.632	0.179	0.41	74	1.54	100	87	-0.020	3.37	0.64
464	82.810	0.178	0.42	74	1.41	99	87	-0.020	3.38	0.64
465	82.989	0.179	0.41	74	1.39	100	87	-0.020	3.39	0.65
466	83.167	0.178	0.41	74	0.63	99	87	-0.020	3.36	0.66
467	83.346	0.179	0.42	74	0.89	100	86	-0.020	3.42	0.66
468	83.524	0.178	0.42	74	0.62	99	87	-0.020	3.46	0.64
469	83.703	0.179	0.41	74	0.79	100	87	-0.020	3.41	0.64
470	83.881	0.178	0.41	74	1.01	99	87	-0.020	3.33	0.63
471	84.060	0.179	0.41	74	2.6	100	86	-0.020	3.36	0.67
472	84.238	0.178	0.42	74	2.63	99	87	-0.020	3.39	0.68
473	84.417	0.179	0.41	74	1.69	100	87	-0.020	3.32	0.65
474	84.595	0.178	0.41	74	2.58	99	87	-0.020	3.34	0.66
475	84.774	0.179	0.42	74	0.44	100	86	-0.020	3.36	0.67
476	84.952	0.178	0.41	74	2.68	99	87	-0.020	3.29	0.67
477	85.131	0.179	0.42	74	1.08	100	86	-0.020	3.40	0.66
478	85.309	0.178	0.42	74	2.61	99	87	-0.020	3.36	0.65
479	85.488	0.179	0.42	74	2.15	100	86	-0.020	3.31	0.68

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 4

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/11/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
480	85.666	0.178	0.41	74	0.51	99	87	-0.020	3.43	0.66
481	85.844	0.178	0.41	74	0.45	99	86	-0.010	3.30	0.66
482	86.023	0.179	0.42	74	2.64	100	87	-0.020	3.36	0.63
483	86.201	0.178	0.41	74	0.52	99	86	-0.020	3.31	0.65
484	86.380	0.179	0.41	74	1.59	100	87	-0.020	3.31	0.65
485	86.558	0.178	0.42	74	2.38	99	86	-0.010	3.40	0.65
486	86.737	0.179	0.41	74	2.74	100	87	-0.020	3.34	0.66
487	86.915	0.178	0.42	74	2.51	99	86	-0.020	3.32	0.67
488	87.094	0.179	0.42	74	0.84	100	87	-0.020	3.30	0.67
489	87.272	0.178	0.41	74	2.47	99	87	-0.010	3.28	0.67
490	87.451	0.179	0.42	74	1.72	100	87	-0.020	3.30	0.67
491	87.629	0.178	0.42	74	1.68	99	86	-0.020	3.39	0.67
492	87.808	0.179	0.42	74	1.72	100	86	-0.010	3.27	0.66
493	87.986	0.178	0.42	74	2.65	99	87	-0.030	3.35	0.66
494	88.165	0.179	0.41	74	0.35	100	86	-0.020	3.32	0.65
495	88.343	0.178	0.42	74	2.59	99	86	-0.020	3.26	0.66
496	88.522	0.179	0.43	74	2.39	99	86	-0.020	3.29	0.67
497	88.700	0.178	0.42	74	1.29	99	86	-0.030	3.33	0.64
498	88.878	0.178	0.41	74	1.38	99	86	-0.010	3.13	0.66
499	89.057	0.179	0.42	74	2.6	100	87	-0.020	3.21	0.68
500	89.235	0.178	0.41	74	0.65	99	87	-0.020	3.34	0.63
501	89.414	0.179	0.42	74	1.31	100	87	-0.020	3.27	0.64
502	89.592	0.178	0.42	74	1.11	99	86	-0.010	3.31	0.61
503	89.771	0.179	0.42	74	1.37	100	87	-0.020	3.44	0.62
504	89.949	0.178	0.41	74	1.02	99	87	-0.020	3.32	0.60
505	90.128	0.179	0.41	74	2.3	99	87	-0.020	3.40	0.61
506	90.306	0.178	0.42	74	2.45	99	86	-0.020	3.43	0.59
507	90.485	0.179	0.42	74	1.22	100	87	-0.020	3.44	0.59
508	90.663	0.178	0.41	74	1.44	99	86	-0.020	3.46	0.58
509	90.842	0.179	0.42	74	1.68	100	87	-0.020	3.53	0.61
510	91.020	0.178	0.43	74	1.13	99	86	-0.020	3.51	0.62
511	91.199	0.179	0.42	74	2.57	100	87	-0.030	3.46	0.60

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 4

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/11/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
512	91.377	0.178	0.42	74	1.33	99	87	-0.010	3.42	0.60
513	91.556	0.179	0.42	74	1.24	100	87	-0.020	3.42	0.60
514	91.734	0.178	0.41	74	0.61	99	87	-0.020	3.47	0.60
515	91.912	0.178	0.42	74	1.28	99	87	-0.020	3.45	0.62
516	92.091	0.179	0.41	74	1.33	100	87	-0.010	3.31	0.63
517	92.269	0.178	0.41	74	0.48	99	87	-0.020	3.19	0.56
518	92.448	0.179	0.42	74	1.3	99	86	-0.020	3.09	0.54
519	92.626	0.178	0.41	74	1.34	99	86	-0.020	3.09	0.54
520	92.805	0.179	0.41	74	1.25	99	86	-0.020	3.01	0.58
521	92.983	0.178	0.41	74	0.56	99	86	-0.010	2.97	0.56
522	93.162	0.179	0.41	74	1.34	99	86	-0.020	2.95	0.53
523	93.340	0.178	0.42	74	1.12	99	87	-0.020	2.86	0.59
524	93.519	0.179	0.42	74	2.6	99	86	-0.020	2.95	0.58
525	93.697	0.178	0.42	74	1.27	99	87	-0.020	2.83	0.60
526	93.876	0.179	0.42	74	1.35	99	86	-0.010	2.90	0.61
527	94.054	0.178	0.41	74	1.39	99	87	-0.020	2.87	0.58
528	94.233	0.179	0.42	74	2.37	99	86	-0.010	2.85	0.59
529	94.411	0.178	0.42	74	2.37	99	87	-0.020	2.86	0.62
530	94.590	0.179	0.41	74	2.65	99	87	-0.020	2.81	0.58
531	94.768	0.178	0.42	74	2.4	99	87	-0.010	2.86	0.59
532	94.946	0.178	0.42	74	1.04	99	86	-0.010	2.76	0.59
533	95.125	0.179	0.42	74	1.09	99	87	-0.010	2.74	0.60
534	95.303	0.178	0.42	74	1.27	99	86	-0.010	2.74	0.56
535	95.482	0.179	0.42	74	2.07	99	87	-0.020	2.78	0.59
536	95.660	0.178	0.41	74	1.51	99	87	-0.020	2.85	0.59
537	95.839	0.179	0.43	74	1.25	99	87	-0.020	2.82	0.57
538	96.017	0.178	0.42	74	2.52	99	86	-0.020	2.68	0.57
539	96.196	0.179	0.42	74	2.59	99	86	-0.020	2.74	0.55
540	96.374	0.178	0.42	74	1.36	99	86	-0.020	2.78	0.54
541	96.553	0.179	0.42	74	0.71	99	87	-0.020	2.70	0.55
542	96.731	0.178	0.42	74	2.56	99	87	-0.030	2.84	0.55
543	96.910	0.179	0.42	74	0.59	99	87	-0.020	2.81	0.54

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 4

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/11/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
544	97.088	0.178	0.41	74	0.88	99	87	-0.020	2.75	0.55
545	97.267	0.179	0.42	74	1.69	99	87	-0.020	2.78	0.54
546	97.445	0.178	0.41	74	2.68	99	86	-0.020	2.69	0.55
547	97.624	0.179	0.41	74	0.59	99	86	-0.020	2.71	0.57
548	97.802	0.178	0.42	74	0.98	99	87	-0.020	2.80	0.58
549	97.980	0.178	0.42	74	1.91	99	86	-0.010	2.67	0.52
550	98.159	0.179	0.42	74	1.72	99	86	-0.020	2.64	0.56
551	98.337	0.178	0.42	74	1.56	99	86	-0.010	2.61	0.56
552	98.516	0.179	0.41	74	1.28	99	87	-0.020	2.71	0.54
553	98.694	0.178	0.42	74	0.71	99	86	-0.020	2.67	0.57
554	98.873	0.179	0.42	74	1.27	99	87	-0.010	2.62	0.55
555	99.051	0.178	0.41	74	2.63	99	86	-0.020	2.70	0.54
556	99.230	0.179	0.41	74	1.37	99	87	-0.020	2.62	0.55
557	99.408	0.178	0.42	74	1.52	99	87	-0.010	2.60	0.54
558	99.587	0.179	0.42	74	1.27	99	87	-0.010	2.59	0.53
559	99.765	0.178	0.42	74	1.34	99	86	-0.010	2.54	0.52
560	99.944	0.179	0.42	74	2.69	99	86	-0.020	2.60	0.53
561	100.122	0.178	0.42	74	2.64	99	86	-0.010	2.49	0.51
562	100.301	0.179	0.42	74	1.3	99	86	-0.020	2.58	0.53
563	100.479	0.178	0.42	74	2.19	99	86	-0.020	2.50	0.51
564	100.658	0.179	0.42	74	2.69	99	86	-0.010	2.60	0.53
565	100.836	0.178	0.42	74	1.74	99	86	-0.020	2.56	0.52
566	101.014	0.178	0.42	74	1.56	99	87	-0.020	2.65	0.53
567	101.193	0.179	0.43	74	1.02	99	86	-0.010	2.58	0.52
568	101.371	0.178	0.43	74	1.61	99	87	-0.010	2.62	0.53
569	101.550	0.179	0.42	74	2.23	99	86	-0.020	2.53	0.52
570	101.728	0.178	0.42	74	1.29	99	87	-0.020	2.63	0.51
571	101.907	0.179	0.41	74	2.03	99	86	-0.020	2.55	0.53
572	102.085	0.178	0.42	74	2.5	99	87	-0.020	2.54	0.51
573	102.264	0.179	0.42	74	2.56	99	86	-0.010	2.53	0.51
574	102.442	0.178	0.41	74	2.37	99	86	-0.010	2.50	0.50
575	102.621	0.179	0.42	74	1.43	99	86	-0.020	2.54	0.50

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 4

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/11/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
576	102.799	0.178	0.41	74	1.35	99	86	-0.020	2.45	0.50
577	102.978	0.179	0.41	74	2.58	99	86	-0.020	2.50	0.46
578	103.156	0.178	0.42	74	2.51	99	86	-0.020	2.50	0.47
579	103.335	0.179	0.42	74	2.25	99	86	-0.010	2.47	0.47
580	103.513	0.178	0.42	74	0.62	99	86	-0.020	2.45	0.47
581	103.692	0.179	0.41	73	1.33	100	86	-0.010	2.42	0.46
582	103.870	0.178	0.42	73	0.38	99	86	-0.010	2.40	0.44
583	104.048	0.178	0.42	73	1.35	99	87	-0.020	2.36	0.46
584	104.227	0.179	0.42	73	1.3	100	87	-0.020	2.41	0.45
585	104.405	0.178	0.42	73	2.34	99	87	-0.010	2.24	0.44
586	104.584	0.179	0.42	73	1.57	100	86	-0.010	2.38	0.45
587	104.762	0.178	0.42	73	0.41	99	86	-0.020	2.31	0.46
588	104.941	0.179	0.42	73	2.52	100	86	-0.020	2.33	0.46
589	105.119	0.178	0.42	73	2.41	99	86	-0.020	2.28	0.45
590	105.298	0.179	0.42	73	2.26	100	86	-0.010	2.30	0.43
591	105.476	0.178	0.42	73	1.23	99	87	-0.020	2.33	0.45
592	105.655	0.179	0.43	73	1.26	100	86	-0.010	2.24	0.40
593	105.833	0.178	0.42	73	2.26	99	86	-0.010	2.20	0.43
594	106.012	0.179	0.41	73	1.32	100	86	-0.010	2.10	0.45
595	106.190	0.178	0.42	73	1.07	99	86	-0.010	2.19	0.45
596	106.369	0.179	0.42	73	0.74	100	86	-0.010	2.13	0.41
597	106.547	0.178	0.43	73	2.37	99	86	-0.020	2.15	0.43
598	106.726	0.179	0.42	73	0.59	100	86	-0.020	2.10	0.44
599	106.904	0.178	0.42	73	1.41	99	86	-0.020	2.08	0.43
600	107.082	0.178	0.43	73	1.17	99	86	-0.010	2.16	0.43
601	107.261	0.179	0.42	73	0.99	100	86	-0.020	2.04	0.43
602	107.439	0.178	0.42	73	2.06	99	87	-0.010	2.12	0.43
603	107.618	0.179	0.43	73	1.93	100	86	-0.010	2.03	0.44
604	107.796	0.178	0.42	73	0.45	99	87	-0.020	2.08	0.43
605	107.975	0.179	0.42	73	1.28	99	86	-0.020	2.16	0.44
606	108.153	0.178	0.42	73	1.4	99	87	-0.010	2.04	0.42
607	108.332	0.179	0.41	73	0.72	99	86	-0.010	1.96	0.43

BOX B TEST DATA - ASTM E3053 / ASTM E2515

Client: IHP
Model: ST210GL
Run #: 4

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/11/2019

	Particulate Sampling Data							Flue Gas Data		
Elapsed Time (min)	Gas Meter (ft^3)	Sample Rate (cfm)	Orifice dH (in H_2O)	Meter Temp (°F)	Meter Vacuum (in Hg)	Pro. Rate (%)	Filter (°F)	Flue Draft (in H_2O)	CO_2 (%)	CO (%)
608	108.510	0.178	0.42	73	1.04	99	86	-0.010	1.98	0.44
609	108.689	0.179	0.41	73	0.71	99	86	-0.020	2.08	0.42
610	108.867	0.178	0.41	73	1.29	99	86	-0.020	2.03	0.45
611	109.046	0.179	0.42	73	2.42	99	86	-0.020	2.02	0.44
612	109.224	0.178	0.42	73	1.25	99	86	-0.010	2.00	0.40
613	109.403	0.179	0.42	73	0.9	99	86	-0.010	1.95	0.43
614	109.581	0.178	0.41	73	2.5	99	86	-0.010	2.03	0.43
615	109.760	0.179	0.42	73	2.58	99	86	-0.010	1.94	0.42
616	109.938	0.178	0.42	73	1.68	99	86	-0.010	1.95	0.42
617	110.116	0.178	0.42	73	2.57	99	86	-0.010	1.97	0.40
618	110.295	0.179	0.42	73	2.05	99	86	-0.010	1.83	0.40
619	110.473	0.178	0.42	73	1.26	99	87	-0.010	2.02	0.42
620	110.652	0.179	0.42	73	1.29	99	86	-0.010	1.85	0.43
621	110.830	0.178	0.42	73	2.63	99	87	-0.010	1.90	0.41
622	111.009	0.179	0.42	73	1.54	99	86	-0.010	1.93	0.40
623	111.187	0.178	0.42	73	2.53	99	87	-0.010	1.94	0.40
624	111.366	0.179	0.42	73	2.52	99	86	-0.010	1.91	0.44
625	111.544	0.178	0.42	73	1.37	99	86	-0.010	1.82	0.41
626	111.723	0.179	0.41	73	2.58	99	87	-0.010	1.83	0.42
627	111.901	0.178	0.41	73	0.67	99	86	-0.010	1.77	0.40
628	112.080	0.179	0.42	73	1.26	99	87	-0.010	1.88	0.40
629	112.258	0.178	0.41	73	0.45	99	86	-0.010	1.88	0.42
630	112.437	0.179	0.41	73	2.34	99	87	-0.010	1.81	0.42
631	112.615	0.178	0.42	73	2.56	99	86	-0.010	1.84	0.40
632	112.794	0.179	0.42	73	2.63	99	86	-0.010	1.86	0.42
633	112.972	0.178	0.42	73	1.25	99	86	-0.020	1.88	0.42
Avg/Tot	112.972	0.178	0.41	75	1.78	100			4.36	0.58

WOODSTOVE SURFACE TEMPERATURE DATA

Client: IHP
Model: ST210GL
Run #: 4

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/11/2019

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
0	472	461	375	463	538	461.8	N/A
1	472	461	377	442	540	458.4	N/A
2	473	461	375	429	543	456.2	N/A
3	472	456	369	428	546	454.2	N/A
4	470	454	377	442	549	458.4	N/A
5	467	450	374	471	551	462.6	N/A
6	465	446	372	510	552	469.0	N/A
7	462	442	368	551	553	475.2	N/A
8	459	436	366	597	553	482.2	N/A
9	456	434	362	653	553	491.6	N/A
10	453	430	366	711	552	502.4	N/A
11	450	425	360	759	551	509.0	N/A
12	448	423	359	799	549	515.6	N/A
13	446	418	356	835	547	520.4	N/A
14	444	415	357	866	544	525.2	N/A
15	443	413	355	892	542	529.0	N/A
16	442	410	348	888	540	525.6	N/A
17	441	410	350	874	538	522.6	N/A
18	440	408	350	861	536	519.0	N/A
19	439	407	351	853	534	516.8	N/A
20	439	405	348	851	532	515.0	N/A
21	439	404	346	851	530	514.0	N/A
22	438	404	349	850	528	513.8	N/A
23	438	401	344	851	526	512.0	N/A
24	438	399	342	849	524	510.4	N/A
25	438	397	340	848	523	509.2	N/A
26	439	398	341	846	521	509.0	N/A
27	439	397	340	847	519	508.4	N/A
28	439	396	338	848	517	507.6	N/A
29	439	397	339	847	515	507.4	N/A
30	439	395	336	847	513	506.0	N/A
31	439	396	336	847	510	505.6	N/A
32	439	397	335	846	508	505.0	N/A
33	440	397	335	844	506	504.4	N/A
34	440	398	336	843	504	504.2	N/A
35	441	396	333	842	502	502.8	N/A
36	442	398	334	842	500	503.2	N/A
37	442	398	333	842	498	502.6	N/A
38	444	399	333	841	495	502.4	N/A
39	445	400	330	839	493	501.4	N/A
40	446	400	331	839	491	501.4	N/A
41	448	400	329	838	489	500.8	N/A
42	449	401	331	838	487	501.2	N/A
43	451	400	328	837	485	500.2	N/A
44	452	401	331	838	483	501.0	N/A
45	454	402	330	837	481	500.8	N/A
46	456	402	328	835	479	500.0	N/A
47	458	404	330	836	477	501.0	N/A

WOODSTOVE SURFACE TEMPERATURE DATA

Client: IHP
Model: ST210GL
Run #: 4

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/11/2019

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
48	459	403	328	834	476	500.0	N/A
49	461	404	330	833	474	500.4	N/A
50	462	405	328	832	472	499.8	N/A
51	464	406	331	830	470	500.2	N/A
52	466	406	330	829	468	499.8	N/A
53	467	408	333	827	467	500.4	N/A
54	469	409	335	825	465	500.6	N/A
55	470	409	335	825	463	500.4	N/A
56	472	410	333	823	462	500.0	N/A
57	473	410	337	820	460	500.0	N/A
58	474	412	337	817	459	499.8	N/A
59	476	413	335	816	457	499.4	N/A
60	477	413	339	813	455	499.4	N/A
61	478	414	336	808	454	498.0	N/A
62	478	414	337	804	453	497.2	N/A
63	479	416	340	801	451	497.4	N/A
64	480	416	341	796	450	496.6	N/A
65	480	418	344	793	448	496.6	N/A
66	481	419	345	789	447	496.2	N/A
67	482	419	344	786	446	495.4	N/A
68	482	419	345	782	444	494.4	N/A
69	483	418	345	778	443	493.4	N/A
70	483	420	345	776	442	493.2	N/A
71	484	421	349	774	441	493.8	N/A
72	485	420	344	772	440	492.2	N/A
73	485	421	349	768	438	492.2	N/A
74	486	422	347	764	437	491.2	N/A
75	487	422	347	763	436	491.0	N/A
76	488	423	352	763	435	492.2	N/A
77	488	422	350	759	434	490.6	N/A
78	489	422	353	754	433	490.2	N/A
79	490	422	352	749	432	489.0	N/A
80	491	422	356	745	431	489.0	N/A
81	492	421	354	739	430	487.2	N/A
82	492	422	354	733	429	486.0	N/A
83	493	421	354	727	428	484.6	N/A
84	493	421	356	723	427	484.0	N/A
85	493	422	358	719	426	483.6	N/A
86	493	422	358	715	425	482.6	N/A
87	494	422	357	710	424	481.4	N/A
88	494	422	359	707	423	481.0	N/A
89	494	422	363	702	422	480.6	N/A
90	493	423	361	698	421	479.2	N/A
91	493	423	363	693	420	478.4	N/A
92	493	424	364	690	419	478.0	N/A
93	493	423	366	686	418	477.2	N/A
94	493	424	366	683	417	476.6	N/A
95	493	424	366	681	416	476.0	N/A

WOODSTOVE SURFACE TEMPERATURE DATA

Client: IHP
Model: ST210GL
Run #: 4

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/11/2019

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
96	493	424	368	677	415	475.4	N/A
97	493	424	364	672	414	473.4	N/A
98	493	423	366	669	413	472.8	N/A
99	493	425	366	667	412	472.6	N/A
100	493	425	366	665	411	472.0	N/A
101	493	423	370	663	410	471.8	N/A
102	494	423	369	663	408	471.4	N/A
103	494	424	368	662	408	471.2	N/A
104	494	424	370	663	407	471.6	N/A
105	494	423	371	665	406	471.8	N/A
106	494	424	371	667	404	472.0	N/A
107	494	424	374	660	403	471.0	N/A
108	494	424	370	656	402	469.2	N/A
109	494	423	373	652	401	468.6	N/A
110	495	423	374	649	400	468.2	N/A
111	495	423	365	645	399	465.4	N/A
112	496	423	365	640	398	464.4	N/A
113	497	423	374	637	397	465.6	N/A
114	497	423	369	630	396	463.0	N/A
115	497	423	373	616	396	461.0	N/A
116	496	423	370	603	394	457.2	N/A
117	495	423	370	590	393	454.2	N/A
118	493	422	363	578	392	449.6	N/A
119	492	423	367	565	391	447.6	N/A
120	490	421	368	554	390	444.6	N/A
121	488	421	367	544	389	441.8	N/A
122	485	420	369	536	388	439.6	N/A
123	483	419	362	527	388	435.8	N/A
124	480	417	367	520	387	434.2	N/A
125	477	416	367	514	386	432.0	N/A
126	475	414	369	508	385	430.2	N/A
127	472	413	362	503	384	426.8	N/A
128	470	413	361	496	383	424.6	N/A
129	467	412	364	492	382	423.4	N/A
130	465	410	356	486	382	419.8	N/A
131	462	409	362	480	381	418.8	N/A
132	460	409	357	475	380	416.2	N/A
133	458	408	362	468	380	415.2	N/A
134	455	405	365	462	378	413.0	N/A
135	453	403	358	456	377	409.4	N/A
136	451	401	358	450	377	407.4	N/A
137	449	398	352	445	376	404.0	N/A
138	446	395	357	440	375	402.6	N/A
139	444	393	357	435	374	400.6	N/A
140	442	391	356	431	373	398.6	N/A
141	440	389	350	427	373	395.8	N/A
142	438	387	349	423	372	393.8	N/A
143	436	384	347	419	372	391.6	N/A

WOODSTOVE SURFACE TEMPERATURE DATA

Client: IHP
Model: ST210GL
Run #: 4

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/11/2019

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
144	434	383	347	416	371	390.2	N/A
145	432	380	347	413	370	388.4	N/A
146	431	379	343	410	370	386.6	N/A
147	429	376	345	407	370	385.4	N/A
148	427	374	344	404	369	383.6	N/A
149	426	373	337	401	369	381.2	N/A
150	424	370	340	399	369	380.4	N/A
151	423	367	332	395	368	377.0	N/A
152	421	366	336	393	368	376.8	N/A
153	420	365	329	390	368	374.4	N/A
154	419	362	332	388	368	373.8	N/A
155	418	360	329	385	368	372.0	N/A
156	416	359	327	383	367	370.4	N/A
157	415	357	326	380	367	369.0	N/A
158	414	355	322	378	367	367.2	N/A
159	413	354	329	376	367	367.8	N/A
160	412	352	323	374	367	365.6	N/A
161	410	351	325	372	367	365.0	N/A
162	409	349	324	370	367	363.8	N/A
163	408	349	322	369	367	363.0	N/A
164	407	347	319	367	366	361.2	N/A
165	406	346	322	365	367	361.2	N/A
166	405	343	321	364	366	359.8	N/A
167	404	343	314	362	366	357.8	N/A
168	403	342	315	360	366	357.2	N/A
169	402	341	315	359	366	356.6	N/A
170	401	340	315	358	366	356.0	N/A
171	400	339	313	356	366	354.8	N/A
172	399	338	315	355	367	354.8	N/A
173	398	337	313	354	367	353.8	N/A
174	397	335	310	353	367	352.4	N/A
175	397	335	310	352	367	352.2	N/A
176	396	333	313	351	367	352.0	N/A
177	395	333	312	350	367	351.4	N/A
178	394	332	307	350	367	350.0	N/A
179	394	332	308	349	367	350.0	N/A
180	393	330	309	348	367	349.4	N/A
181	392	330	310	348	367	349.4	N/A
182	391	329	308	347	368	348.6	N/A
183	391	329	305	347	368	348.0	N/A
184	390	328	307	346	368	347.8	N/A
185	390	328	305	346	368	347.4	N/A
186	389	327	307	346	368	347.4	N/A
187	388	326	310	347	368	347.8	N/A
188	388	326	306	347	369	347.2	N/A
189	388	325	307	348	369	347.4	N/A
190	387	324	306	350	369	347.2	N/A
191	386	325	305	352	369	347.4	N/A

WOODSTOVE SURFACE TEMPERATURE DATA

Client: IHP
Model: ST210GL
Run #: 4

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/11/2019

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
192	386	324	303	355	369	347.4	N/A
193	386	324	306	355	369	348.0	N/A
194	385	325	305	353	369	347.4	N/A
195	385	324	304	351	369	346.6	N/A
196	384	324	301	349	369	345.4	N/A
197	384	324	304	348	369	345.8	N/A
198	384	323	302	346	369	344.8	N/A
199	384	322	301	344	369	344.0	N/A
200	385	322	280	333	368	337.6	N/A
201	386	323	262	321	368	332.0	N/A
202	386	323	249	311	367	327.2	N/A
203	386	323	236	301	367	322.6	N/A
204	386	322	227	293	366	318.8	N/A
205	385	321	219	285	366	315.2	N/A
206	385	322	212	278	366	312.6	N/A
207	385	322	207	272	365	310.2	N/A
208	384	321	202	266	365	307.6	N/A
209	383	321	198	261	365	305.6	N/A
210	383	320	194	256	364	303.4	N/A
211	382	320	192	252	364	302.0	N/A
212	381	319	189	248	364	300.2	N/A
213	380	318	186	244	364	298.4	N/A
214	379	317	185	241	364	297.2	N/A
215	378	317	183	238	363	295.8	N/A
216	377	315	180	235	363	294.0	N/A
217	376	314	178	232	363	292.6	N/A
218	375	314	177	229	363	291.6	N/A
219	374	312	175	227	363	290.2	N/A
220	373	312	174	225	362	289.2	N/A
221	371	311	173	223	362	288.0	N/A
222	370	310	172	221	362	287.0	N/A
223	369	309	170	220	361	285.8	N/A
224	368	308	169	218	361	284.8	N/A
225	367	307	168	217	360	283.8	N/A
226	366	306	166	215	360	282.6	N/A
227	364	305	166	214	359	281.6	N/A
228	364	304	165	213	359	281.0	N/A
229	362	303	164	212	358	279.8	N/A
230	361	302	163	211	358	279.0	N/A
231	360	302	161	209	358	278.0	N/A
232	359	300	161	208	357	277.0	N/A
233	357	300	160	207	357	276.2	N/A
234	356	299	159	206	357	275.4	N/A
235	355	299	158	205	357	274.8	N/A
236	354	298	157	204	356	273.8	N/A
237	353	297	157	203	356	273.2	N/A
238	352	296	156	202	356	272.4	N/A
239	351	296	155	202	355	271.8	N/A

WOODSTOVE SURFACE TEMPERATURE DATA

Client: IHP
Model: ST210GL
Run #: 4

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/11/2019

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
240	350	295	155	201	355	271.2	N/A
241	348	294	154	200	355	270.2	N/A
242	347	294	154	200	355	270.0	N/A
243	346	293	153	199	354	269.0	N/A
244	345	293	152	198	354	268.4	N/A
245	344	293	152	198	354	268.2	N/A
246	343	292	152	197	354	267.6	N/A
247	342	291	151	197	354	267.0	N/A
248	341	291	151	196	354	266.6	N/A
249	340	291	150	196	353	266.0	N/A
250	339	290	150	196	353	265.6	N/A
251	338	290	149	195	353	265.0	N/A
252	337	289	149	195	353	264.6	N/A
253	336	288	148	194	353	263.8	N/A
254	335	288	147	194	352	263.2	N/A
255	335	287	147	194	352	263.0	N/A
256	334	287	147	193	352	262.6	N/A
257	333	287	146	193	351	262.0	N/A
258	332	287	146	193	351	261.8	N/A
259	331	286	146	193	351	261.4	N/A
260	330	286	146	192	351	261.0	N/A
261	330	286	145	192	351	260.8	N/A
262	329	286	145	192	351	260.6	N/A
263	328	285	145	191	351	260.0	N/A
264	327	285	144	191	350	259.4	N/A
265	327	284	144	191	350	259.2	N/A
266	326	285	144	190	349	258.8	N/A
267	325	285	144	190	349	258.6	N/A
268	324	284	143	190	349	258.0	N/A
269	324	284	143	189	349	257.8	N/A
270	323	283	143	189	348	257.2	N/A
271	322	284	142	189	348	257.0	N/A
272	322	283	143	189	348	257.0	N/A
273	321	283	142	189	348	256.6	N/A
274	320	283	142	189	348	256.4	N/A
275	319	283	143	188	348	256.2	N/A
276	319	283	142	188	348	256.0	N/A
277	318	282	141	188	348	255.4	N/A
278	318	283	141	187	347	255.2	N/A
279	317	283	141	187	347	255.0	N/A
280	316	283	141	187	347	254.8	N/A
281	316	282	141	186	346	254.2	N/A
282	315	283	141	186	346	254.2	N/A
283	315	282	141	186	346	254.0	N/A
284	314	282	141	185	345	253.4	N/A
285	313	282	140	185	345	253.0	N/A
286	313	282	141	184	344	252.8	N/A
287	312	282	140	184	343	252.2	N/A

WOODSTOVE SURFACE TEMPERATURE DATA

Client: IHP
Model: ST210GL
Run #: 4

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/11/2019

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
288	312	282	141	184	343	252.4	N/A
289	311	282	140	184	342	251.8	N/A
290	311	282	140	183	341	251.4	N/A
291	310	282	138	183	341	250.8	N/A
292	309	281	139	182	340	250.2	N/A
293	309	281	139	182	340	250.2	N/A
294	308	281	139	182	339	249.8	N/A
295	308	281	139	182	339	249.8	N/A
296	307	281	138	181	338	249.0	N/A
297	306	281	138	181	338	248.8	N/A
298	306	281	138	181	337	248.6	N/A
299	305	281	138	180	337	248.2	N/A
300	305	281	137	180	336	247.8	N/A
301	304	281	137	180	335	247.4	N/A
302	304	281	138	180	334	247.4	N/A
303	303	281	137	179	334	246.8	N/A
304	302	281	137	179	334	246.6	N/A
305	302	282	137	179	333	246.6	N/A
306	301	280	137	178	332	245.6	N/A
307	301	281	136	178	331	245.4	N/A
308	300	281	136	178	331	245.2	N/A
309	300	281	136	178	331	245.2	N/A
310	299	281	136	178	331	245.0	N/A
311	299	281	136	177	330	244.6	N/A
312	298	281	136	177	329	244.2	N/A
313	298	281	136	177	329	244.2	N/A
314	297	280	135	177	329	243.6	N/A
315	297	280	135	177	328	243.4	N/A
316	297	280	135	176	327	243.0	N/A
317	296	281	135	176	327	243.0	N/A
318	296	281	135	177	326	243.0	N/A
319	296	280	135	177	326	242.8	N/A
320	295	281	135	177	325	242.6	N/A
321	295	280	135	177	325	242.4	N/A
322	295	280	135	176	324	242.0	N/A
323	295	280	135	176	324	242.0	N/A
324	294	281	135	176	323	241.8	N/A
325	294	281	135	176	323	241.8	N/A
326	293	281	135	176	323	241.6	N/A
327	293	280	135	176	322	241.2	N/A
328	293	279	135	176	321	240.8	N/A
329	293	280	135	176	320	240.8	N/A
330	292	280	134	176	320	240.4	N/A
331	292	280	135	176	320	240.6	N/A
332	292	280	135	176	319	240.4	N/A
333	292	281	135	176	319	240.6	N/A
334	292	281	135	176	319	240.6	N/A
335	292	281	135	176	319	240.6	N/A

WOODSTOVE SURFACE TEMPERATURE DATA

Client: IHP
Model: ST210GL
Run #: 4

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/11/2019

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
336	292	281	135	176	319	240.6	N/A
337	292	281	135	176	319	240.6	N/A
338	292	280	135	175	319	240.2	N/A
339	292	281	135	175	318	240.2	N/A
340	293	280	135	175	319	240.4	N/A
341	292	280	135	175	318	240.0	N/A
342	292	280	135	175	318	240.0	N/A
343	292	280	135	174	318	239.8	N/A
344	292	280	135	174	318	239.8	N/A
345	292	280	135	174	318	239.8	N/A
346	292	280	135	174	318	239.8	N/A
347	292	279	135	174	318	239.6	N/A
348	292	279	135	174	318	239.6	N/A
349	292	280	135	173	318	239.6	N/A
350	293	279	135	173	317	239.4	N/A
351	293	278	135	173	317	239.2	N/A
352	293	278	135	173	317	239.2	N/A
353	293	279	135	174	317	239.6	N/A
354	293	278	135	174	317	239.4	N/A
355	293	279	135	174	316	239.4	N/A
356	292	279	135	174	316	239.2	N/A
357	292	279	135	174	316	239.2	N/A
358	292	279	135	174	316	239.2	N/A
359	292	279	135	174	316	239.2	N/A
360	292	279	135	174	315	239.0	N/A
361	292	279	135	174	315	239.0	N/A
362	292	279	135	174	315	239.0	N/A
363	292	278	135	174	314	238.6	N/A
364	291	279	135	174	314	238.6	N/A
365	291	278	135	173	314	238.2	N/A
366	291	278	135	173	314	238.2	N/A
367	291	278	135	173	313	238.0	N/A
368	290	278	135	173	313	237.8	N/A
369	290	278	135	173	313	237.8	N/A
370	290	278	135	173	312	237.6	N/A
371	290	278	135	172	312	237.4	N/A
372	289	279	135	172	311	237.2	N/A
373	289	278	135	172	311	237.0	N/A
374	289	279	134	172	311	237.0	N/A
375	288	279	135	171	310	236.6	N/A
376	288	279	134	171	310	236.4	N/A
377	288	279	134	171	310	236.4	N/A
378	288	278	134	171	310	236.2	N/A
379	287	278	134	171	309	235.8	N/A
380	287	278	134	171	309	235.8	N/A
381	287	278	134	171	308	235.6	N/A
382	287	278	134	171	308	235.6	N/A
383	287	277	134	171	307	235.2	N/A

WOODSTOVE SURFACE TEMPERATURE DATA

Client: IHP
Model: ST210GL
Run #: 4

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/11/2019

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
384	287	278	135	171	308	235.8	N/A
385	286	278	133	171	307	235.0	N/A
386	286	278	134	170	306	234.8	N/A
387	286	277	134	170	306	234.6	N/A
388	286	277	134	170	306	234.6	N/A
389	286	277	134	170	305	234.4	N/A
390	285	276	134	170	305	234.0	N/A
391	285	277	134	170	305	234.2	N/A
392	285	277	134	170	304	234.0	N/A
393	285	276	134	169	304	233.6	N/A
394	285	276	134	169	304	233.6	N/A
395	285	276	134	169	304	233.6	N/A
396	285	275	134	169	303	233.2	N/A
397	285	275	134	169	303	233.2	N/A
398	285	275	134	169	303	233.2	N/A
399	284	275	134	169	303	233.0	N/A
400	284	274	134	168	302	232.4	N/A
401	284	275	134	168	302	232.6	N/A
402	284	275	134	168	302	232.6	N/A
403	283	274	134	168	302	232.2	N/A
404	283	274	135	168	302	232.4	N/A
405	283	274	134	168	301	232.0	N/A
406	283	274	135	168	301	232.2	N/A
407	282	273	136	167	300	231.6	N/A
408	282	273	135	167	300	231.4	N/A
409	282	273	136	167	299	231.4	N/A
410	281	273	136	167	299	231.2	N/A
411	281	273	136	167	299	231.2	N/A
412	281	273	136	167	299	231.2	N/A
413	280	273	137	167	299	231.2	N/A
414	280	273	137	167	298	231.0	N/A
415	279	273	137	167	298	230.8	N/A
416	279	273	138	167	298	231.0	N/A
417	278	273	138	167	298	230.8	N/A
418	278	273	138	167	298	230.8	N/A
419	277	274	138	167	298	230.8	N/A
420	277	274	138	167	297	230.6	N/A
421	277	274	139	167	297	230.8	N/A
422	276	274	139	167	297	230.6	N/A
423	276	274	139	167	296	230.4	N/A
424	275	274	139	167	296	230.2	N/A
425	275	274	139	166	296	230.0	N/A
426	275	275	139	166	295	230.0	N/A
427	274	274	140	166	295	229.8	N/A
428	274	275	140	166	296	230.2	N/A
429	273	275	141	166	295	230.0	N/A
430	273	275	140	166	295	229.8	N/A
431	272	275	141	166	294	229.6	N/A

WOODSTOVE SURFACE TEMPERATURE DATA

Client: IHP
Model: ST210GL
Run #: 4

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/11/2019

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
432	272	275	140	165	294	229.2	N/A
433	272	276	141	166	294	229.8	N/A
434	271	276	141	166	294	229.6	N/A
435	271	276	141	166	293	229.4	N/A
436	271	276	142	166	293	229.6	N/A
437	270	276	142	166	293	229.4	N/A
438	270	277	142	166	293	229.6	N/A
439	270	276	142	166	292	229.2	N/A
440	270	277	142	166	292	229.4	N/A
441	269	277	143	166	292	229.4	N/A
442	269	277	143	166	292	229.4	N/A
443	269	278	144	167	291	229.8	N/A
444	269	278	144	167	291	229.8	N/A
445	268	278	144	167	291	229.6	N/A
446	268	278	144	167	291	229.6	N/A
447	268	278	145	167	291	229.8	N/A
448	268	278	145	167	290	229.6	N/A
449	267	279	145	168	290	229.8	N/A
450	267	279	146	167	290	229.8	N/A
451	267	279	146	167	290	229.8	N/A
452	267	279	146	167	290	229.8	N/A
453	267	280	147	167	289	230.0	N/A
454	267	280	147	167	289	230.0	N/A
455	266	280	147	167	289	229.8	N/A
456	266	281	148	167	289	230.2	N/A
457	266	281	148	166	289	230.0	N/A
458	266	281	148	166	289	230.0	N/A
459	266	282	148	166	289	230.2	N/A
460	266	282	148	166	288	230.0	N/A
461	265	282	148	166	288	229.8	N/A
462	265	281	147	166	288	229.4	N/A
463	265	282	148	166	288	229.8	N/A
464	265	282	148	166	288	229.8	N/A
465	265	283	148	166	288	230.0	N/A
466	264	283	147	165	287	229.2	N/A
467	264	283	147	165	287	229.2	N/A
468	264	283	147	165	287	229.2	N/A
469	263	283	146	165	287	228.8	N/A
470	263	284	146	164	286	228.6	N/A
471	263	283	146	164	286	228.4	N/A
472	263	284	145	164	286	228.4	N/A
473	262	284	146	164	285	228.2	N/A
474	262	284	145	164	285	228.0	N/A
475	262	284	145	164	285	228.0	N/A
476	262	284	145	163	284	227.6	N/A
477	261	284	145	163	284	227.4	N/A
478	261	284	145	163	283	227.2	N/A
479	261	285	144	163	283	227.2	N/A

WOODSTOVE SURFACE TEMPERATURE DATA

Client: IHP
Model: ST210GL
Run #: 4

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/11/2019

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
480	261	284	145	163	283	227.2	N/A
481	260	285	143	162	283	226.6	N/A
482	260	285	143	162	282	226.4	N/A
483	260	285	143	162	282	226.4	N/A
484	260	284	143	162	282	226.2	N/A
485	260	284	143	162	281	226.0	N/A
486	259	284	143	162	281	225.8	N/A
487	259	285	144	162	280	226.0	N/A
488	259	285	143	161	280	225.6	N/A
489	258	285	142	161	280	225.2	N/A
490	258	285	142	161	280	225.2	N/A
491	258	285	142	161	279	225.0	N/A
492	257	284	142	161	279	224.6	N/A
493	257	285	142	161	279	224.8	N/A
494	257	285	142	160	278	224.4	N/A
495	257	285	142	160	278	224.4	N/A
496	257	284	142	160	278	224.2	N/A
497	256	284	142	160	277	223.8	N/A
498	256	284	142	160	277	223.8	N/A
499	256	284	141	159	277	223.4	N/A
500	255	283	141	159	277	223.0	N/A
501	255	284	141	159	277	223.2	N/A
502	255	284	141	159	276	223.0	N/A
503	254	284	141	159	276	222.8	N/A
504	254	284	141	159	276	222.8	N/A
505	254	284	140	159	276	222.6	N/A
506	253	283	141	159	275	222.2	N/A
507	253	284	141	158	275	222.2	N/A
508	253	284	140	158	275	222.0	N/A
509	252	284	140	158	275	221.8	N/A
510	252	284	141	158	275	222.0	N/A
511	252	284	141	158	274	221.8	N/A
512	251	283	140	158	274	221.2	N/A
513	251	284	140	158	274	221.4	N/A
514	251	283	140	158	274	221.2	N/A
515	250	283	140	157	273	220.6	N/A
516	250	284	140	157	273	220.8	N/A
517	249	283	140	157	273	220.4	N/A
518	249	283	140	157	272	220.2	N/A
519	249	284	140	157	272	220.4	N/A
520	249	284	141	156	271	220.2	N/A
521	248	284	139	156	272	219.8	N/A
522	248	282	140	156	271	219.4	N/A
523	247	283	140	155	271	219.2	N/A
524	247	282	140	155	271	219.0	N/A
525	246	282	140	155	270	218.6	N/A
526	246	281	140	154	270	218.2	N/A
527	245	280	140	154	270	217.8	N/A

WOODSTOVE SURFACE TEMPERATURE DATA

Client: IHP
Model: ST210GL
Run #: 4

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/11/2019

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
528	245	280	139	154	270	217.6	N/A
529	244	280	140	154	270	217.6	N/A
530	244	279	140	153	270	217.2	N/A
531	243	279	140	153	270	217.0	N/A
532	243	278	139	153	270	216.6	N/A
533	242	278	139	152	269	216.0	N/A
534	242	277	139	152	269	215.8	N/A
535	241	277	139	151	268	215.2	N/A
536	241	276	138	151	268	214.8	N/A
537	240	276	139	151	268	214.8	N/A
538	240	275	138	150	267	214.0	N/A
539	239	275	138	150	267	213.8	N/A
540	239	274	137	149	267	213.2	N/A
541	238	274	137	149	267	213.0	N/A
542	238	273	137	149	267	212.8	N/A
543	237	273	136	148	266	212.0	N/A
544	237	272	136	148	266	211.8	N/A
545	236	271	136	148	266	211.4	N/A
546	235	271	135	147	265	210.6	N/A
547	235	270	136	147	265	210.6	N/A
548	234	270	135	147	265	210.2	N/A
549	234	269	135	146	265	209.8	N/A
550	233	269	135	146	264	209.4	N/A
551	233	268	134	146	263	208.8	N/A
552	232	267	134	145	263	208.2	N/A
553	232	267	134	145	263	208.2	N/A
554	231	267	133	145	262	207.6	N/A
555	231	266	133	144	262	207.2	N/A
556	230	265	133	144	262	206.8	N/A
557	229	265	132	143	262	206.2	N/A
558	229	265	132	143	261	206.0	N/A
559	228	264	132	143	261	205.6	N/A
560	228	263	132	143	260	205.2	N/A
561	227	262	131	142	260	204.4	N/A
562	226	262	131	142	260	204.2	N/A
563	226	261	131	142	260	204.0	N/A
564	225	261	130	141	259	203.2	N/A
565	225	260	130	141	259	203.0	N/A
566	224	260	130	140	259	202.6	N/A
567	224	260	130	140	259	202.6	N/A
568	223	259	129	140	258	201.8	N/A
569	223	258	129	140	258	201.6	N/A
570	222	258	129	140	258	201.4	N/A
571	222	257	128	139	257	200.6	N/A
572	222	257	128	139	257	200.6	N/A
573	221	256	128	139	256	200.0	N/A
574	221	256	128	138	256	199.8	N/A
575	220	255	127	138	256	199.2	N/A

WOODSTOVE SURFACE TEMPERATURE DATA

Client: IHP
Model: ST210GL
Run #: 4

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/11/2019

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
576	220	255	127	138	255	199.0	N/A
577	220	254	127	137	255	198.6	N/A
578	219	253	127	137	255	198.2	N/A
579	219	253	126	137	254	197.8	N/A
580	219	252	126	136	254	197.4	N/A
581	218	252	126	136	254	197.2	N/A
582	218	252	126	136	254	197.2	N/A
583	218	250	125	135	253	196.2	N/A
584	217	250	125	135	253	196.0	N/A
585	217	249	125	135	252	195.6	N/A
586	217	249	125	134	252	195.4	N/A
587	216	248	124	134	251	194.6	N/A
588	216	248	124	134	251	194.6	N/A
589	215	247	124	133	250	193.8	N/A
590	215	246	124	133	250	193.6	N/A
591	214	246	123	133	250	193.2	N/A
592	214	245	123	132	249	192.6	N/A
593	213	244	122	132	249	192.0	N/A
594	213	244	122	132	249	192.0	N/A
595	212	243	122	131	248	191.2	N/A
596	212	243	122	131	247	191.0	N/A
597	211	242	122	131	247	190.6	N/A
598	210	241	121	130	247	189.8	N/A
599	210	241	121	130	246	189.6	N/A
600	209	240	120	129	246	188.8	N/A
601	209	239	120	129	246	188.6	N/A
602	208	238	120	129	246	188.2	N/A
603	207	238	120	128	245	187.6	N/A
604	207	237	119	128	245	187.2	N/A
605	206	236	119	127	244	186.4	N/A
606	205	236	119	127	244	186.2	N/A
607	205	235	118	127	243	185.6	N/A
608	204	235	118	126	243	185.2	N/A
609	203	234	118	126	242	184.6	N/A
610	203	233	118	125	242	184.2	N/A
611	202	232	117	125	242	183.6	N/A
612	201	232	117	125	241	183.2	N/A
613	201	231	116	124	241	182.6	N/A
614	200	230	116	124	240	182.0	N/A
615	199	230	116	123	240	181.6	N/A
616	199	229	116	123	240	181.4	N/A
617	198	228	115	123	239	180.6	N/A
618	197	228	115	122	238	180.0	N/A
619	197	227	114	122	238	179.6	N/A
620	196	226	114	122	238	179.2	N/A
621	195	226	114	121	237	178.6	N/A
622	195	225	114	121	236	178.2	N/A
623	194	225	114	121	236	178.0	N/A

WOODSTOVE SURFACE TEMPERATURE DATA

Client: IHP
Model: ST210GL
Run #: 4

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/11/2019

	Temperature Data (°F)						
Elapsed Time (min)	FB Left	FB Right	FB Back	FB Top	FB Bottom	Stove Surface Average	Catalyst Exit
624	193	224	113	120	236	177.2	N/A
625	193	223	113	120	235	176.8	N/A
626	192	222	113	120	234	176.2	N/A
627	192	222	112	119	234	175.8	N/A
628	191	221	111	119	234	175.2	N/A
629	190	221	111	119	234	175.0	N/A
630	190	220	112	118	233	174.6	N/A
631	189	219	111	118	232	173.8	N/A
632	188	219	111	118	232	173.6	N/A
633	188	218	110	117	231	172.8	N/A
Average	332	314	204	307	341	300	N/A

LAB SAMPLE DATA - ASTM E2515

Client: IHP
Model: ST210GL
Run #: 4

Job #: 19-468
Tracking #: 0026
Technician: SJB
Date: 4/11/2019

TRAIN A (1st Hour)

Sample Component	Sample Type	Filter, Probe, or O-Ring #	Weights		
			Final, mg	Tare, mg	Particulate, mg
A. Front filter catch	Filter	T202/T203	182.0	177.4	4.6
B. Rear filter catch	Filter				0.0
C. Probe catch*	Probe				0.0
D. O-Ring catch*	O-Ring				0.0

Sub-Total	Total Particulate, mg:	4.6

TRAIN A (Post 1st hour)

Sample Component	Sample Type	Filter, Probe, or O-Ring #	Weights		
			Final, mg	Tare, mg	Particulate, mg
A. Front filter catch	Filter	T208	185.6	88.2	8.8
B. Rear filter catch	Filter	T204		88.6	
C. Probe catch*	Probe	2A	116240.9	116239.9	1.0
D. O-Ring catch*	O-Ring	2A	3548.8	3548.0	0.8

Sub-Total	Total Particulate, mg:	10.6
Train A Aggregate	Total Particulate, mg:	**15.2**

TRAIN B

Sample Component	Reagent	Filter, Probe, or O-Ring #	Weights		
			Final, mg	Tare, mg	Particulate, mg
A. Front filter catch	Filter	T205/T207/T209	368.9	265.3	15.1
B. Rear filter catch	Filter	T206		88.5	
C. Probe catch*	Probe	2B	116331.0	116330.2	0.8
D. O-Ring catch*	O-Ring	2B	3567.1	3566.3	0.8

Total Particulate, mg:	**16.7**

AMBIENT

Sample Component	Reagent	Filter, Probe, or O-Ring #	Weights		
			Final, mg	Tare, mg	Particulate, mg
A. Filter catch*	Filter				0.0

Total Particulate, mg:	**0.0**

*Particulate catch that results in a negative number, is assumed to be zero for probes and O-rings, negative numbers for filters are assumed to be part of the O-Ring weight.

ASTM E3053 Wood Heater Run Sheets

Client: IHP | Job Number: 19-468 | Tracking #: 0026
Model: ST210GL | Run Number: 4 | Test Date: 4/11/2019

Wood Heater Run Notes

Pre-Test Notes
Pre-Test Start Time: 8:40
Air Control Setting: Fully Open

Time	Notes
N/A	See test Run 3 notes for full detail, test Run 4 is being performed as a continuation of Run 3. With 2.6 lbs of fuel left, the coal bed was leveled, and the scale was zeroed in preparation of fuel loading.

Test Notes
Test Burn Start Time: 12:30
Air Control Setting: Medium Air Setting

Time	Notes
0 min	Loaded test fuel within 40 seconds, door closed immediately thereafter.
12 min	Changed front filter on both trains
15 min	Closed air to medium test setting
60 min	Changed 1-hr filter
633 min	End of Test

Test Burn End Time: 11:03

Flue Gas Concentration Measurement

Calibration Gas Values: Span Gas CO_2 (%): 9.00 CO (%): 0.500
Mid Gas CO_2 (%): - CO (%): -

Calibration Results:

	Pre Test			Post Test		
	Zero	Mid	Span	Zero	Mid	Span
Time	8:26	-	8:29	4/12 – 8:00	-	4/12 – 8:05
CO_2	0.00	-	9.00	0.08	-	8.79
CO	0.00	-	0.500	0.004	-	0.486

Flue Gas Probe Leak Check: Initial: No Leakage Final: No Leakage

Technician Signature:  Date: 4/15/2019

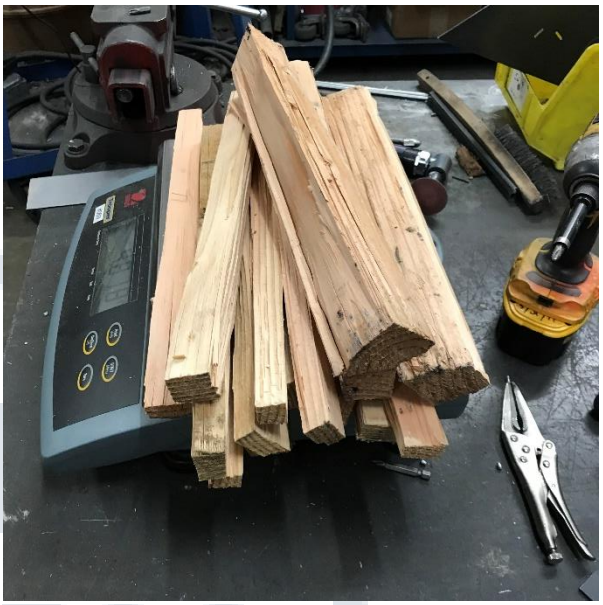
ASTM E3053 Wood Heater Run Sheets

Client: IHP | Job Number: 19-468 | Tracking #: 0026
Model: ST210GL | Run Number: 4 | Test Date: 4/11/2019

Test Photos



Kindling Fuel Load



Start-up Fuel Load



High Fire Fuel Load



Residual Start-up Fuel Coal Bed

Technician Signature: _____ Date: 4/15/2019

ASTM E3053 Wood Heater Run Sheets

Client: IHP Job Number: 19-468 Tracking #: 0026
Model: ST210GL Run Number: 4 Test Date: 4/11/2019



High Fire Fuel Loaded



Residual High Fire Load Coal Bed



Medium Fire Fuel Load



Medium Fire Fuel Loaded

Technician Signature: Date: 4/15/2019

Sample Pre-Test Tare Sheet: ☐ Probes ☒ TX40 Filters ☐ O-Rings

Date/Time In Desiccator: 3/28/19 - 16:00 Balance ID#: 107 Audit Weight ID# / Weight(mg): 109A-100mg

Sample ID	Date/Time	Weight (mg)	Date/Time	Weight (mg)	Date/Time	Weight (mg)	Date/Time	Weight (mg)	Tech. Initials	Project/Run #
T181	4/5- 8:00	89.2	4/8- 6:30	89.3	-	-	-	-	SB	19-468 #1
T182		88.7		88.8	-	-	-	-	SB	
T183		89.5		89.2	4/9-6:00	89.3	-	-	SB	
T184		88.1		88.2	-	-	-	-	SB	
T185		88.6		88.7	-	-	-	-	SB	
T186		89.3		89.3	-	-	-	-	SB	
T187		88.6		88.6	-	-	-	-	SB	
T188		89.3		89.3	-	-	-	-	SB	
T189		88.7		88.8	-	-	-	-	SB	19-468 #2
T190		88.7		88.8	-	-	-	-	SB	
T191		88.6		88.7	-	-	-	-	SB	
T192		88.9		89.2	4/9-6:00	89.3	-	-	SB	
T193		88.9		89.0	-	-	-	-	SB	
T194		88.7		88.8	-	-	-	-	SB	
T195		88.4		88.5	-	-	-	-	SB	
T196		88.2		88.5	4/9-6:00	88.3	-	-	SB	
T197		88.5		88.4	-	-	-	-	SB	19-468 #3
T198		89.1		89.2	-	-	-	-	SB	
T199		88.3		88.4	-	-	-	-	SB	
T200		88.9		89.0	-	-	-	-	SB	
T201		88.5		88.4	-	-	-	-	SB	
T202		88.7		88.7	-	-	-	-	SB	19-468 #4
T203		88.7		88.7	-	-	-	-	SB	
T204		88.7		88.6	-	-	-	-	SB	
T205		88.3		88.4	-	-	-	-	SB	
T206		88.6		88.5	-	-	-	-	SB	
T207		88.4		88.3	-	-	-	-	SB	
T208		88.3		88.2	-	-	-	-	SB	
T209		88.4		88.7	4/9-6:00	88.6	-	-	SB	
T210		88.0		88.0	-	-	-	-	SB	-

Sample Post-Test Analysis Sheet: ☐ Probes ☒ TX40 Filters ☐ O-Rings

Balance ID#: 107 Audit Weight ID# / Weight (mg): 109A-100mg

Sample ID	Tare (mg)	Date/ Time in Desiccator	Date/ Time	Weight (mg)	Date/ Time	Weight (mg)	Date/ Time	Weight (mg)	Date/ Time	Weight (mg)	Tech. Initials
T181	89.3	–	–	–	–	–	–	–	–	–	SB
T182	88.8	–	–	–	–	–	–	–	–	–	SB
T183	89.3	–	–	–	–	–	–	–	–	–	SB
T184	88.2	–	–	–	–	–	–	–	–	–	SB
T185	88.7	–	–	–	–	–	–	–	–	–	SB
T186	89.3	–	–	–	–	–	–	–	–	–	SB
T187	88.6	–	–	–	–	–	–	–	–	–	SB
T188	89.3	–	–	–	–	–	–	–	–	–	SB
T189	88.8	4/13 - 10:00	4/17 - 12:30	> 181.3	4/18 - 8:00	> 181.2	–	–	–	–	SB
T190	88.8	↓	↓	↓	↓	↓	–	–	–	–	SB
T191	88.7	↓	↓	178.4	↓	178.5	–	–	–	–	SB
T192	89.3	↓	↓	}	↓	}	–	–	–	–	SB
T193	89.0	↓	↓	360.2	↓	360.2	–	–	–	–	SB
T194	88.8	↓	↓	}	↓	}	–	–	–	–	SB
T195	88.5	↓	↓	↓	↓	↓	–	–	–	–	SB
T196	88.3	↓	↓	* weighed as a pair	↓	with T 191 *					SB
T197	88.4	↓	↓	93.6	4/18 - 8:00	93.5	–	–	–	–	SB
T198	89.2	↓	↓	> 180.7	↓	> 180.8	–	–	–	–	SB
T199	88.4	↓	↓	↓	↓	↓	–	–	–	–	SB
T200	89.0	↓	↓	> 185.1	↓	> 185.1	–	–	–	–	SB
T201	88.4	↓	↓	↓	↓	↓	–	–	–	–	SB
T202	88.7	↓	↓	> 181.9	↓	> 182.0	–	–	–	–	SB
T203	88.7	↓	↓	↓	↓	↓	–	–	–	–	SB
T204	88.6	↓	↓	185.6	↓	185.6	–	–	–	–	SB
T205	88.5	↓	↓	}	↓	}	–	–	–	–	SB
T206	88.5	↓	↓	369.0	↓	368.9	–	–	–	–	SB
T207	88.3	↓	↓	↓	↓	↓	–	–	–	–	SB
T208	88.2	↓	↓	* weighed as a pair	↓	with T 204					SB
T209	88.6	↓	↓	* weighed as a pair	↓	with T209, 206, + 207					SB
T210	88.0	–	–	–	–	–	–	–	–	–	SB

Sample Pre-Test Tare Sheet: ☒ Probes ☐ Filters ☐ O-Rings

Date/Time In Desiccator: 1/17/19 - 8:00 Balance ID#: 107 Audit Weight ID# / Weight(mg): 109A/B – 100/200mg

Sample ID	Date/Time	Weight (mg)	Date/Time	Weight (mg)	Date/Time	Weight (mg)	Date/Time	Weight (mg)	Tech. Initials	Project/Run #
1A	1/24 - 10:00	115627.8	1/24 - 8:00	115627.7	–	–	–	–	JD	18-447 #1
1B		115902.3		115902.3	–	–	–	–	SD	18-447 #1
2A		116239.5		116239.6	–	–	–	–	SB	18-447 #2
2B		116329.5		116329.4	–	–	–	–	SB	18-447 #2
3A		116072.9		116072.9	–	–	–	–	SB	18-447 #3
3B		116339.8		116339.7	–	–	–	–	SB	18-447 #3
4A		116182.2	2/1/19-8:45	116182.3	–	–	–	–	SB	18-439 #1
4B		116365.2	2/1 - 8:45	116365.3	–	–	–	–	SB	18-439 #1
5A	2/20 - 17:00	116768.2	2/21 - 13:00	116768.1	–	–	–	–	SB	19-460 #Ass.1
5B		116876.5		116876.2	2/22 - 15:30	116876.1	–	–	SB	19-460 #Ass.1
6A		116543.9		116543.8	–	–	–	–	SB	19-460 #Ass.2
6B		116117.0		116116.9	–	–	–	–	SB	19-460 #Ass.2
7A		116739.9		116739.9	–	–	–	–	SB	19-460 #1
7B		117287.7		117287.7	–	–	–	–	SB	19-460 #1
8A	2/26 - 15:00	116824.0	2/27 - 7:00	116824.1	–	–	–	–	SB	19-460 #2
8B	2/26 - 15:00	116826.3	2/27 - 7:00	116826.1	–	–	–	–	SB	19-460 #2
9A	2/26 - 15:00	116713.8	2/27 - 7:00	116713.6	–	–	–	–	SB	19-460 #3
9B	2/26 - 15:00	117135.5	2/27 - 7:00	117135.4	–	–	–	–	SB	19-460 #3
10A	3/25 - 12:00	116818.3	3/26 - 12:00	116818.4	–	–	–	–	SB	19-470 #1
10B	3/25 - 12:00	117167.1	3/26 - 12:00	117167.3	–	–	–	–	SB	19-470 #1
11A	4/3 - 10:00	117034.7	4/4 - 15:30	117034.7	–	–	–	–	SB	19-468 #1
11B		116657.8		116657.9	–	–	–	–	SB	19-468 #1
12A		116888.0		116888.1	–	–	–	–	SB	19-468 #2
12B		117051.6		117051.7	–	–	–	–	SB	19-468 #2
13A		117454.8		117455.0	–	–	–	–	SB	19-468 #3
13B		117053.5		117053.6	–	–	–	–	SB	19-468 #3
14A		116816.8		116816.8	–	–	–	–	SB	19-469 #1
14B		116770.6		116770.8	–	–	–	–	SB	"
15A		117418.0		117417.9	–	–	–	–	SB	19-469 #2
15B		116905.0		116905.3	4/5 9:00	116905.3	–	–	SB	"

Sample Post-Test Analysis Sheet: ☒ Probes ☐ Filters ☐ O-Rings

Balance ID#: 107 Audit Weight ID# / Weight (mg): 109A/B – 100/200mg

Sample ID	Tare (mg)	Date/ Time in Desiccator	Date/ Time	Weight (mg)	Date/ Time	Weight (mg)	Date/ Time	Weight (mg)	Date/ Time	Weight (mg)	Tech. Initials
1A	115627.7	1/28 - 15:10	1/30 - 7:30	115628.7	1/31 - 8:00	115628.5	-	-	-	-	SB
1B	115902.3	1/28 - 15:10	1/30 - 7:30	115963.0	1/31 - 8:00	115902.8	-	-	-	-	SB
2A	116239.6	1/30 - 8:00	1/31 - 8:00	116239.8	2/1 - 8:45	116239.9	-	-	-	-	SB
2B	116329.4	1/30 - 8:00	1/31 - 8:00	116329.9	2/1 - 8:45	116330.0	-	-	-	-	SB
3A	116072.9	1/31 - 8:30	2/1 - 8:45	116073.4	2/2 - 7:30	116073.5	-	-	-	-	SB
3B	116339.7	1/31 - 8:30	2/1 - 8:45	116340.1	2/2 - 7:30	116340.1	-	-	-	-	SB
4A	116182.3	2/4 - 15:45	2/6 - 8:30	116182.4	2/7 - 8:00	116182.3	-	-	-	-	SB
4B	116365.3	2/4 - 15:45	2/6 - 8:30	116365.1	2/7 - 8:00	116365.2	-	-	-	-	SB
5A	116768.1	2/25 - 14:00	2/27 - 13:30	116768.7	2/28 - 6:30	116768.5	-	-	-	-	SB
5B	116876.1	2/25 - 14:00	2/27 - 13:30	116876.2	2/28 - 6:30	116876.2	-	-	-	-	SB
6A	116543.5	2/27 - 7:30	3/1 - 10:00	116544.4	3/4 - 8:00	116544.2	-	-	-	-	SB
6B	116116.9	2/27 - 7:30	3/1 - 10:00	116117.6	3/4 - 8:00	116117.5	-	-	-	-	SB
7A	116739.9	2/27 - 12:00	3/1 - 10:00	116740.2	3/4 - 8:00	116740.1	-	-	-	-	SB
7B	117287.7	2/27 - 12:00	3/1 - 10:00	117287.9	3/4 - 8:00	117288.0	-	-	-	-	SB
8A	116824.1	2/28 - 7:00	3/1 - 10:00	116824.3	3/4 - 8:00	116824.2	-	-	-	-	SB
8B	116826.1	2/28 - 7:00	3/1 - 10:00	116826.1	3/4 - 8:00	116826.0	-	-	-	-	SB
9A	116713.6	3/1 - 10:30	3/4 - 8:00	116713.6	3/5 - 8:00	116713.5	-	-	-	-	SB
9B	117135.4	3/1 - 10:30	3/4 - 8:00	117135.4	3/5 - 8:00	117135.2	-	-	-	-	SB
10A	116818.4	3/28 - 15:20	4/1 - 8:00	116818.6	4/2 - 8:00	116818.6	-	-	-	-	SB
10B	117167.3	3/28 - 15:20	4/1 - 8:00	117167.1	4/2 - 8:00	117167.2	-	-	-	-	SB
11A	117034.7	4/13 - 10:00	-	-	-	-	-	-	-	-	SB
11B	116657.9	4/13 - 10:00	-	-	-	-	-	-	-	-	SB
12A	116889.1	4/13 - 10:00	4/17 - 12:30	116888.8	4/18 - 8:00	116888.6	-	-	-	-	SB
12B	117051.7	4/13 - 10:00	4/17 - 12:30	117052.1	4/18 - 8:00	117052.1	-	-	-	-	SB
13A	117455.0	4/13 - 10:00	4/17 - 12:30	117455.9	4/18 - 8:00	117455.7	-	-	-	-	SB
13B	117053.6	4/13 - 10:00	4/17 - 12:30	117054.3	4/18 - 8:00	117053.9	4/19 - 8:00	117054.1	-	-	SB
14A	116817.0	4/8/19	4/10 0800	116817.1	4/15 1030	116817.0	-	-	-	-	
14B	116770.8	4/8/19	4/10 0800	116771.0	4/15 1030	116770.8	-	-	-	-	
15A	117417.9	4/9/19	4/15 1030	117418.1	4/18 0900	117418.1	-	-	-	-	
15B	116405.3	4/9/19	4/15 1030	116405.5	4/18 0900	116405.4	-	-	-	-	

Sample Pre-Test Tare Sheet: ☒ Probes ☐ Filters ☐ O-Rings

Date/Time In Desiccator: 2/5- 12:00 Balance ID#: 107 Audit Weight ID# / Weight(mg): 109A/B – 100/200mg

Sample ID	Date/Time	Weight (mg)	Date/Time	Weight (mg)	Date/Time	Weight (mg)	Date/Time	Weight (mg)	Tech. Initials	Project/Run #
1A	4/3 - 10:00	115628.8	4/4 - 15:30	115629.1	4/5 - 8:00	115628.9	–	–	SB	469-19 #8
1B	↓	115903.0	↓	115903.2	–	–	–	–	SB	↓
2A		116239.7		116240.0	4/5 - 8:00	116239.9	–	–	SB	~~469-19 #4~~
2B		116330.1		116330.2	–	–	–	–	SB	19-468 #4
3A		116073.5		116073.6	–	–	–	–	SB	469-19 #4
3B	↓	116340.4	↓	116340.3	–	–	–	–	SB	↓
4A	4/19 - 16:00	116183.3	4/22 - 11:00	116183.1	–	–	–	–	SB	19-464 #1
4B	↓	116365.8	↓	116365.9	–	–	–	–	SB	19-464 #1
5A		116769.6		116769.7	–	–	–	–	SB	19-464 #2
5B		116877.2		116877.4	–	–	–	–	SB	19-464 #2
6A		116544.3		116544.4	–	–	–	–	SB	19-464 #3
6B	↓	116117.2	↓	116117.3	–	–	–	–	SB	19-464 #3
7A										
7B										
8A										
8B										
9A										
9B										
10A										
10B										
11A										
11B										
12A										
12B										
13A										
13B										
14A										
14B										
15A										
15B										

Sample Post-Test Analysis Sheet: ☒ Probes ☐ Filters ☐ O-Rings

Balance ID#: 107 Audit Weight ID# / Weight (mg): 109A/B – 100/200mg

Sample ID	Tare (mg)	Date/ Time in Desiccator	Date/ Time	Weight (mg)	Date/ Time	Weight (mg)	Date/ Time	Weight (mg)	Date/ Time	Weight (mg)	Tech. Initials
1A	115628.9	–	–	–	–	–	–	–	–	–	SB
1B	115903.2	–	–	–	–	–	–	–	–	–	SB
2A	116239.9	4/13 - 10:00	4/17 - 12:30	116240.9	4/18- 8:00	116240.9	–	–	–	–	SB
2B	116330.2	4/13- 10:00	4/17 - 12:30	116331.2	4/18- 8:00	116331.0	–	–	–	–	SB
3A	116073.6	4/11/19	4/15 1030	116073.7	4/18 0900	116073.8	–	–	–	–	
3B	116340.3	4/11/19	4/15 1030	116340.5	4/18 0900	116340.5	–	–	–	–	
4A	116183.1	4/23 - 16:30	4/25 - 13:30	116184.8	4/26 - 8:00	116184.0	4/29- 7:30	116184.1	–	–	SB
4B	116365.9	4/23 - 16:30	4/25 - 13:30	116367.0	4/26 - 8:00	116366.4	4/29 - 7:30	116366.5	–	–	SB
5A	116769.7	4/24 - 10:20	4/25 - 13:30	116770.1	4/26 - 8:00	116769.5	4/29 - 7:30	116769.5	–	–	SB
5B	116877.4	4/24 - 10:20	4/25 - 13:30	116877.8	4/26 - 8:00	116877.3	4/29 - 7:30	116877.3	–	–	SB
6A	116544.4	4/26 - 9:00	4/29 - 7:30	116544.8	4/30 - 8:00	116544.9	–	–	–	–	SB
6B	116117.3	4/26 - 9:00	4/29 - 7:30	116117.5	4/30 - 8:00	116117.6	–	–	–	–	SB
7A											
7B											
8A											
8B											
9A											
9B											
10A											
10B											
11A											
11B											
12A											
12B											
13A											
13B											
14A											
14B											
15A											
15B											

Sample Pre-Test Tare Sheet: ☐ Probes ☐ Filters ☒ O-Rings

Date/Time In Desiccator: 1/17/2019 - 8:00 Balance ID#: 107 Audit Weight ID# / Weight(mg): 109B-200mg

Sample ID	Date/Time	Weight (mg)	Date/Time	Weight (mg)	Date/Time	Weight (mg)	Date/Time	Weight (mg)	Tech. Initials	Project/Run #
1A	1/24 - 10:00	3562.0	1/24 - 16:30	3562.0	-	-	-	-	SB	18-447 #1
1B		3550.9		3550.8	-	-	-	-	SB	18- 447 #1
2A		3548.0		3547.9	-	-	-	-	SB	18- 447 #2
2B		3566.4		3566.5	-	-	-	-	SB	18- 447 #2
3A		3575.4		3575.2	-	-	-	-	SB	18- 447 #3
3B		3563.8		3563.8	-	-	-	-	SB	18- 447 #3
4A		3588.8	2/1 - 8:45	3588.4	2/2 - 7:30	3588.3	-	-	SB	18-459 #1
4B		3576.4	2/1 - 8:45	3575.7	2/2 - 7:30	3575.7	-	-	SB	18- 439 #1
5A	2/20 - 17:00	3529.7	2/21 - 13:00	3529.7	-	-	-	-	SB	19- 460 #Ass.1
5B		3526.4		3526.3	-	-	-	-	SB	19- 460 #Ass.1
6A		3610.3		3610.2	-	-	-	-	SB	19- 460 #Ass.2
6B		3379.9		3380.0	-	-	-	-	SB	19- 460 #Ass.2
7A		3569.0		3569.1	-	-	-	-	SB	19- 460 #1
7B		3517.8		3517.8	-	-	-	-	SB	19-460 #1
8A	2/26 - 15:00	3547.0	2/27 - 7:00	3547.0	-	-	-	-	SB	19- 460 #2
8B		3580.2		3580.3	-	-	-	-	SB	19- 460 #2
9A		3577.1		3577.1	-	-	-	-	SB	19- 460 #3
9B		3520.0		3519.9	-	-	-	-	SB	19- 460 #3
10A	3/25/19 12:00	3413.9	3/26 - 12:00	3414.1	-	-	-	-	SB	19- 470 #1
10B	3/25 - 12:00	3565.7	3/26 12:00	3565.8	-	-	-	-	SB	19- 470 #1
11A	4/3 - 10:00	3408.2	4/4 - 15:30	3408.7	4/8 - 6:30	3409.4	4/9 - 6:00	3409.3	SB	19- 468 #1
11B		4219.9		4220.7		4221.0		4220.9	SB	19-468 #1
12A		3415.9		3416.5		3416.9		3417.0	SB	19-468 #2
12B		3388.6		3388.9		3389.4		3381.5	SB	19-468 # 2
13A		3443.5		3444.0		3444.3		3444.4	SB	19-468 # 3
13B		3483.5		3484.0		3484.4		3485.5	SB	19-468 # 3
14A		3360.1		3360.2	-	-	-	-	SB	19- 46a #1
14B		3334.7		3334.6	-	-	-	-	SB	"
15A		3565.7		3565.5	-	-	-	-	SB	19- 46a #2
15B		3566.3		3565.9	4/5 - 8:00	3566.1	-	-	SB	"

Sample Post-Test Analysis Sheet: ☐ Probes ☐ Filters ☒ O-Rings

Balance ID#: 107 Audit Weight ID# / Weight (mg): 109B-200mg

Sample ID	Tare (mg)	Date/ Time in Desiccator	Date/ Time	Weight (mg)	Date/ Time	Weight (mg)	Date/ Time	Weight (mg)	Date/ Time	Weight (mg)	Tech. Initials
1A	3562.0	1/28 - 15:10	1/30 - 7:30	3562.3	1/31 - 8:00	3562.0	2/1 - 8:45	3562.0	–	–	SB
1B	3550.8	1/28 - 15:10	1/30 - 7:30	3551.1	1/31 - 8:00	3550.9	–	–	–	–	SB
2A	3547.9	1/30 - 8:00	1/31 - 8:00	3548.5	2/1 - 8:45	3548.2	2/2 - 7:30	3548.2	–	–	SB
2B	3566.5	1/30 - 8:00	1/31 - 8:00	3566.8	2/1 - 8:45	3566.6	–	–	–	–	SB
3A	3575.2	1/31 - 8:30	2/1 - 8:45	3575.9	2/2 - 7:30	3575.8	–	–	–	–	SB
3B	3563.8	1/31 - 8:30	2/1 - 8:45	3564.0	2/2 - 7:30	3563.8	–	–	–	–	SB
4A	3588.3	2/4 - 15:45	2/6 - 8:30	3588.4	2/7 - 8:00	3588.4	–	–	–	–	SB
4B	3575.7	2/4 - 15:45	2/6 - 8:30	3576.1	2/7 - 8:00	3576.0	–	–	–	–	SB
5A	3529.7	2/25 - 14:00	2/27 - 13:30	3529.9	2/28 - 6:30	3530.0	–	–	–	–	SB
5B	3526.3	2/25 - 14:00	2/27 - 13:30	3527.0	2/28 - 6:30	3526.8	–	–	–	–	SB
6A	3610.2	2/27 - 7:30	3/1 - 10:00	3611.0	3/4 - 8:00	3610.9	–	–	–	–	SB
6B	3380.0	2/27 - 7:30	↓	3380.5	3/4 - 8:00	3380.5	–	–	–	–	SB
7A	3569.1	2/27 - 12:00		3569.2	3/4 - 8:00	3569.2	–	–	–	–	SB
7B	3517.8	2/27 - 12:00		3517.9	3/4 - 8:00	3517.9	–	–	–	–	SB
8A	3547.0	2/28 - 7:00		3547.2	3/4 - 8:00	3547.2	–	–	–	–	SB
8B	3580.3	2/28 - 7:00	↓	3581.0	3/4 / 8:00	3581.1	–	–	–	–	SB
9A	3577.1	3/1 - 10:30	3/4 - 8:00	3577.2	3/5 - 8:00	~~3520.1~~ 3577.2	–	–	–	–	SB
9B	3519.9	3/1 - 10:30	3/4 - 8:00	3520.0	3/5 - 8:00	3520.1	–	–	–	–	SB
10A	3414.1	3/28 - 15:20	4/1 - 8:00	3415.3	4/2 - 8:00	3415.2	–	–	–	–	SB
10B	3565.8	3/28 - 15:20	4/1 - 8:00	3565.9	4/2 - 8:00	3566.1	–	–	–	–	SB
11A	3409.3	4/13 - 10:00	4/17 - 12:30	–	4/18 - 8:00	–	–	–	–	–	SB
11B	4220.9	4/13 - 10:00	↓	–	↓	–	–	–	–	–	SB
12A	3417.0	4/13 - 10:00		3418.1		3418.0	–	–	–	–	SB
12B	3389.5	4/13 - 10:00		3390.6		3390.7	–	–	–	–	SB
13A	3444.4	4/13 - 10:00		3445.6		3445.6	–	–	–	–	SB
13B	3485.5	4/13 - 10:00	↓	3486	↓	3486.7	–	–	–	–	SB
14A	3360.2	4/8/19	4/10 0800	3360.6	4/15 1600	3360.6	–	–	–	–	A
14B	3334.6	↓	↓	3334.9		3334.9	–	–	–	–	A
15A	3565.5	~~3567.0 Avg~~	4/15/11:00	3567.0	4/16 0830	3567.0	–	–	–	–	A
15B	3566.1	4/8/19	↓	3567.7	↓	3567.6	–	–	–	–	A

Sample Pre-Test Tare Sheet: ☐ Probes ☐ Filters ☒ O-Rings

Date/Time In Desiccator: 2/5/19 - 12:00 Balance ID#: 107 Audit Weight ID# / Weight(mg): 109B-200mg

Sample ID	Date/Time	Weight (mg)	Date/Time	Weight (mg)	Date/Time	Weight (mg)	Date/Time	Weight (mg)	Tech. Initials	Project/Run #
1A	4/3 - 10:00	3562.3	4/4 - 15:30	3562.0	4/5 - 8:00	3562.1	-	-	SB	19-469 #3
1B	↓	3551.6	↓	3550.9	-	-	-	-	SB	↓
2A	↓	3548.0	↓	3548.0	-	-	-	-	SB	19-468 #4
2B	↓	3566.3	↓	3566.3	-	-	-	-	SB	19-468 #4
3A	↓	3575.3	↓	3575.4	-	-	-	-	SB	19-469 #4
3B	↓	3563.7	↓	3563.9	-	-	-	-	SB	19-469 - #4
4A	4/8 - 6:30	3587.8	4/19 - 16:00	3588.0	-	-	-	-	SB	19-464 #1
4B	↓	3575.9	↓	3576.0	-	-	-	-	SB	19-464 #1
5A	↓	3529.7	↓	3529.9	-	-	-	-	SB	19-464 #2
5B	↓	3526.6	↓	3526.8	-	-	-	-	SB	19-464 #2
6A	4/19 - 16:00	3611.3	4/22 - 11:00	3610.9	4/23 - 8:00	3610.9	-	-	SB	19-464 #3
6B	↓	3385.7	↓	3384.9	4/24 8:00	3385.0	-	-	SB	19-464 #3
7A										
7B										
8A										
8B										
9A										
9B										
10A										
10B										
11A										
11B										
12A										
12B										
13A										
13B										
14A										
14B										
15A										
15B										

Sample Post-Test Analysis Sheet: ☐ Probes ☐ Filters ☒ O-Rings

Balance ID#: 107 Audit Weight ID# / Weight (mg): 109B-200mg

Sample ID	Tare (mg)	Date/ Time in Desiccator	Date/ Time	Weight (mg)	Date/ Time	Weight (mg)	Date/ Time	Weight (mg)	Date/ Time	Weight (mg)	Tech. Initials
1A	3562.1		4/15 11:00	-	-	-	-	-	-	-	SB
1B	3550.9		4/15 11:00	-	-	-	-	-	-	-	SB
2A	3548.0	4/13-10:00	4/17-12:30	3549.0	4/18-8:00	3548.8	-	-	-	-	SB
2B	3566.3	4/13-10:00	4/17-12:30	3567.2	4/18-8:00	3567.1	-	-	-	-	SB
3A	3575.4	4/4/19	4/15 11:00	3575.6	4/16 0830	3575.5	-	-	-	-	A
3B	3563.9	4/4/19	4/15 11:00	3563.9	4/16 0830	3569.0	-	-	-	-	A
4A	3588.0	4/23-16:30	4/25-13:30	3588.4	4/26-8:00	3588.4	-	-	-	-	SB
4B	3576.0	4/23-16:30	4/25-13:30	3576.3	4/26-8:00	3576.2	-	-	-	-	SB
5A	3529.9	4/24-10:20	4/25-13:30	3530.4	4/26-8:00	3530.3	-	-	-	-	SB
5B	3526.3	4/24-10:20	4/25-13:30	3527.0	4/26-8:00	3527.0	-	-	-	-	SB
6A	3610.9	4/26-9:00	4/29-7:30	3611.1	4/30-8:00	3611.1	-	-	-	-	SB
6B	3385.0	4/26-9:00	4/29-7:30	3385.2	4/30-8:00	3385.0	-	-	-	-	SB
7A											
7B											
8A											
8B											
9A											
9B											
10A											
10B											
11A											
11B											
12A											
12B											
13A											
13B											
14A											
14B											
15A											
15B											

Certificate of Accuracy - Standard Scale

Date Completed: 03/14/2019
Order #: 1420927
Cert #: 14209271
For: INNOVATIVE HEARTH PRODUCTS

Ship To Address: 1502 14TH ST NW
AUBURN, WA 98001
Shop Address: MICHELLI MEASUREMENT GROUP
19612 70TH AVE. SOUTH, #2-5, KENT, WA 98032

WID No: 102697
MFG: AWTX
Model: WI125
Serial No: 71712
Location
Asset No:
Other:
Next Due:

Capacity: 1000
Division: 0.1
Units: LBS

Readings

Reading	Applied Weight	As Found	Final	+/- Tolerance	As Found Error
1	100.0	99.9	100.0	0.2	-0.1
2	250.0	249.9	250.0	0.3	-0.1
3	550.0	550.3	550.0	0.5	0.3
4	805.0	805.4	805.0	0.5	0.4

Corner Test

Applied Weight: 550.0

Corner/Shift	As Found	Final	+/- Tolerance	As Found Error
1	550.0	550.0	0.5	0.0
2	550.0	550.0	0.5	0.0
3	550.0	550.0	0.5	0.0
4	550.0	550.0	0.5	0.0

Michelli Measurement Group certifies this instrument has been repaired, if necessary and calibrated to published manufacturers specification with standards traceable to a National Metrological Institute such as NIST, to consensus standards, to ratio methods or to accepted fundamental physical constants. This certificate only applies to the above listed item. Michelli Measurement Group Quality Management System meets the requirements of ISO 9001. This document shall not be reproduced, except for in full without expressed written permission of Michelli Measurement Group.

Scale Details

Temperature:
% Relative Humidity:
Condition of Scale: Good
Initial Tolerance: In
Final Tolerance: In
Cert Type: H-44

Certificate:
OR-17-209-F

Standards Used: 16-50LB
Test Date: 2017-08-26 **Retest Date:** 2019-07-26
Weight: **UoM:** LBS

Notes

CALIBRATED, TESTED AND INSPECTED SCALE TESTED GOOD AFTER ADJUSTMENTS

Technician
BRANDIN SLISH

License Number
791

B.S.

Dry Gas Meter Calibration

Meter Manufacturer:	Apex
Model:	XC-60-EP
Lab ID #:	IHP Box A
Serial #:	8001993
Calibration Date:	1/25/2019
Calibration Expiration:	7/25/2019
Barometric Pressure:	30.33 in. Hg

Reference Standard DGM	
Manufacturer:	Apex
Model:	SK25DA
Lab ID#:	47
Serial #:	1101001
Calibration Expiration Date:	3/5/2019
Calibration γ Factor:	0.998

Unit Under Test Previous Calibration	
Date	6/20/2018
γ Factor:	0.988
Allowable Deviation (±5%):	0.0494
Actual Deviation:	0.00
Result:	PASS

Calibration Data	Run 1	Run 2	Run 3
Standard DGM Initial Volume (L)	0.000	0.000	0.000
Standard DGM Final Volume (L)	141.496	143.413	142.137
Standard DGM Temperature (°F)	70.0	70.0	68.0
Standard DGM Pressure (in H_2O)	0.00	0.00	0.0
DGM Initial Volume (ft^3)	0.000	0.000	0.000
DGM Final Volume (ft^3)	5.124	5.200	5.107
DGM Temperature (°F)	76.0	77.0	74.0
DGM Pressure (in H_2O)	0.55	0.40	0.17
Time (min)	24.0	28.0	50.0
Net Volume for Standard DGM (ft^3)	4.997	5.065	5.020
Net Volume for DGM (ft^3)	5.124	5.200	5.107

Dry Gas Meter γ Factor	0.983	0.984	0.992
γ Factor Deviation From Average	0.983	0.984	0.992

Average Gas Meter γ Factor: 0.986

Calculations:

1. Deviation = |Average value for all runs - current run value|
2. $\gamma = [V_{std} \times (\gamma_{Std}) \times (P_{bar}+P_{std}/13.6) \times (T_{DGM} + 460)] / [V_{DGM} \times (T_{std} + 460) \times (P_{bar} + P_{DGM}/ 13.6)]$

Standard Reference Meter is calibrated to NIST traceable standards. Uncertainty of measurement is ±0.5%.

Technician: _____

Dry Gas Meter Calibration

Meter Manufacturer:	Apex
Model:	XC-60-EP
Lab ID #:	IHP Box B
Serial #:	8001994
Calibration Date:	1/28/2019
Calibration Expiration:	7/28/2019
Barometric Pressure:	30.18 in. Hg

Reference Standard DGM	
Manufacturer:	Apex
Model:	SK25DA
Lab ID#:	47
Serial #:	1101001
Calibration Expiration Date:	3/5/2019
Calibration γ Factor:	0.998

Unit Under Test Previous Calibration	
Date	4/3/2013
γ Factor:	0.988
Allowable Deviation (±5%):	0.0494
Actual Deviation:	0.02
Result:	PASS

Calibration Data	Run 1	Run 2	Run 3
Standard DGM Initial Volume (L)	0.000	0.000	0.000
Standard DGM Final Volume (L)	152.200	151.585	171.917
Standard DGM Temperature (°F)	69.0	69.0	69.0
Standard DGM Pressure (in H_2O)	0.00	0.00	0.0
DGM Initial Volume (ft^3)	0.000	0.000	0.000
DGM Final Volume (ft^3)	5.447	5.437	6.035
DGM Temperature (°F)	77.0	76.0	77.0
DGM Pressure (in H_2O)	0.50	0.30	0.2
Time (min)	26.0	36.0	67.0
Net Volume for Standard DGM (ft^3)	5.375	5.353	6.071
Net Volume for DGM (ft^3)	5.447	5.437	6.035

Dry Gas Meter γ Factor	0.998	0.995	1.019
γ Factor Deviation From Average	0.998	0.995	1.019

Average Gas Meter γ Factor: 1.004

Calculations:

1. Deviation = |Average value for all runs - current run value|
2. $\gamma = [V_{std} \times (\gamma_{Std}) \times (P_{bar}+P_{std}/13.6) \times (T_{DGM} + 460)] / [V_{DGM} \times (T_{std} + 460) \times (P_{bar} + P_{DGM}/ 13.6)]$

Standard Reference Meter is calibrated to NIST traceable standards. Uncertainty of measurement is ±0.5%.

Technician:

ACCREDITED
A2LA Certificate No. 1750.01
Calibration

Calibration complies with ISO/IEC 17025, ANSI/NCSL Z540-1, and 9001

Cert. No.: 4198-9765787

Traceable® Certificate of Calibration for Hand Held Barometer

Customer :PFS TECO Suite 305 ,11785 SE Highway 212 ,Clackamas ,OR-97015 ,U.S.A.

Instrument Identification:

Model: 4198, S/N: 80531676 Manufacturer: Control Company

Standards/Equipment:

Description	Serial Number	Due Date	NIST Traceable Reference
Digital Barometer	D4540001	09 Oct 2018	1000415948
Digital Thermometer	111879345	09 Apr 2019	4000-9377595

Certificate Information:

Technician: 57 Procedure: CAL-32 Cal Date: 29 Aug 2018 Cal Due Date: 29 Aug 2019

Test Conditions: 62.73%RH 23.92°C 1018mBar

Calibration Data:

Unit(s)	Nominal	As Found	In Tol	Nominal	As Left	In Tol	Min	Max	±U	TUR
°C	24.10	24.1	Y	23.51	23.9	Y	22.01	25.01	0.05	>4:1
mb/hPa	551.55	552	Y	551.62	546	Y	544	560	0.62	>4:1
mb/hPa	751.22	744	Y	748.87	746	Y	741	757	0.62	>4:1
mb/hPa	1015.90	1011	Y	1018.22	1017	Y	1010	1026	0.62	>4:1

This certificate indicates Traceability to standards provided by (NIST) National Institute of Standards and Technology and/or a National Standards Laboratory.

A Test Uncertainty Ratio of at least 4:1 is maintained unless otherwise stated and is calculated using the expanded measurement uncertainty. Uncertainty evaluation includes the instrument under test and is calculated in accordance with the ISO "Guide to the Expression of Uncertainty in Measurement : (GUM). The uncertainty represents an expanded uncertainty using a coverage factor k=2 to approximate a 95% confidence level. In tolerance conditions are based on test results falling within specified limits with no reduction by the uncertainty of the measurement. The results contained herein relate only to the item calibrated. This certificate shall not be reproduced except in full, without written approval of Control Company.

Nominal=Standard's Reading; As Left=Instrument's Reading; In Tol=In Tolerance; Min/Max=Acceptance Range; ± U=Expanded Measurement Uncertainty; TUR=Test Uncertainty Ratio; Accuracy=±(Max-Min)/2; Min=As Left Nominal(Rounded) – Tolerance; Max= As Left Nominal(Rounded) + Tolerance;

Nicol Rodriguez

Nicol Rodriguez, Quality Manager

Aaron Judice

Aaron Judice. Technical Manager

Note :

Maintaining Accuracy:

In our opinion once calibrated your Hand Held Barometer should maintain its accuracy. There is no exact way to determine how long calibration will be maintained. Hand Held Barometer change little, if any at all, but can be affected by aging, temperature, shock, and contamination.

Recalibration:

For factory calibration and re-certification traceable to National Institute of Standards and Technology contact Control Company.

CONTROL COMPANY 12554 Galveston RD Suite B230 Webster TX USA 77598
Phone 281 482-1714 Fax 281 482-9448 sales@control3.com www.control3.com

Control Company is an ISO/IEC 17025:2005 Calibration Laboratory Accredited by (A2LA) American Association for Laboratory Accreditation, Certificate No. 1750.01.
Control Company is ISO 9001:2008 Quality Certified by DNV GL, Certificate No. CERT-01805-2006-AQ-HOU-RvA.
International Laboratory Accreditation Cooperation (ILAC) - Multilateral Recognition Arrangement (MRA).

Traceable® is a registered trademark of Control Company

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Established 1974

QUALITY CONTROL SERVICES

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2340 SE 11TH Ave. Portland, Oregon 97214 • Box 14831 Portland, Oregon 97293

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ACCREDITED

Calibration Services

Certificate Number: 1550.01

Laboratory code: 115953

Report of Calibration

Firm: Dirigo Laboratories
Address: 11785 SE Hwy 212, Ste 305
City/State/Zip: Clackamas, OR 97015

Test Completed: 03/21/17
Submitted By: John Steiner
Traceable Number: 20170468

Test Item: 200mg and 100mg Individual Weights
Serial No.: Listed in Table

Manufacturer: Troemner

Material	Assumed Density	Range	Tolerance Class
Stainless Steel	7.95 g/cm^3	200mg & 100mg	ASTM Class 1

Method and Traceability
The procedure used for this calibration is NIST IR 6969 SOP 4 Double Substitution Weighing Design. Standards used for comparison are traceable to the National Institute of Standards and Technology (reports on file) and are part of a comprehensive measurement assurance program for ensuring continued accuracy and traceability within the level of uncertainty reported. The Traceable Number listed above is Traceable to National Standards through an unbroken chain of comparison each having stated uncertainties.

Standards Used:
100g to 1mg Working Standards Were Calibrated: 03/03/17 Due: 03/31/18 Standards ID: 723318
Mass Comparators Used: MET-05 **Tested by:** D. Thompson

Conventional Mass: "The conventional value of the result of weighing a body in air is equal to the mass of a standard, of conventionally chosen density, at a conventionally chosen temperature, which balances this body at this reference temperature in air of conventionally chosen density. International Recommendation 33 (OIML IR 33 1973, 1979). "Conventional Value of the Result of Weighing in Air" **(Previously known as "Apparent Mass vs. 8.0g/cm^3).**

Uncertainty Statement: The uncertainty conforms to the ISO Guide to the Expressions of Uncertainty in Measurement. Uncertainty as reported is based on a coverage factor k=2 for an approximate 95 percent level of uncertainty. Uncertainty components include the standard deviation of the process, the uncertainty of the standard used, an uncertainty component associated with the potential drift of the standard used, and the estimated uncertainty related to measuring and determining the air buoyancy effect.

Conventional Mass Values are listed on page 2 of this report.

Quality Control Services, Inc.
Metrology Laboratory Manager
E-mail dthompson@qc-services.com

Date: 03/21/17

Signature David S. Thompson

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Member: National Conference of Standards Laboratories and Weights & Measures

Established 1974

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Calibration Services

Certificate Number: 1550.01

Laboratory code: 115953

Report of Calibration

Firm: Dirigo Laboratories
Address: 11785 SE Hwy 212, Ste 305
City/State/Zip: Clackamas, OR 97015

Test Completed: 03/21/17
Submitted By: John Steiner
Traceable Number: 20170468

Test Item: 200mg and 100mg Individual Weights
Serial No.: Listed in Table

Manufacturer: Troemner

Laboratory Environment at time of test

Temperature °C	Pressure mmHg	Humidity %RH
21.967	753.44	49.44

Conventional Mass Value

Nominal Value	As Found grams	As Found Correction* (mg)	Uncertainty (mg)	Tolerance (mg)
200mg SN 1000101395	0.2000061	0.0061	0.0026	0.01
100mg SN 1000126267	0.1000046	0.0046	0.0028	0.01

*Correction is the difference between the conventional mass value of a weight and its nominal value.

Comments: These weights were new from the manufacturer and were within ASTM Class 1 tolerances As Found. No adjustments or changes were made so As Found values should be considered to be As Left values.

Accredited by the American Association for Laboratory Accreditation (A2LA) under Calibration Laboratory Code 115953 and Certificate Number 1550.01. This laboratory meets the requirements of ISO/IEC 17025:2005 *General Requirements for the Competence of Testing and Calibration Laboratories.* This laboratory also meets the requirements of ANSI/NCSL Z540-1-1994 and any additional program requirements in the field of calibration.

Quality Control Services, Inc.
Metrology Laboratory Manager
E-mail dthompson@qc-services.com

Date: 03/21/17

Signature David S. Thompson

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Member: National Conference of Standards Laboratories and Weights & Measures

Established 1974

QUALITY CONTROL SERVICES

LABORATORY EQUIPMENT • SALES • SERVICE • CALIBRATION • REPAIRS
2340 SE 11TH Ave. Portland, Oregon 97214 • Box 14831 Portland, Oregon 97293
(503) 236-2712 • FAX (503) 235-2535 • www.qc-services.com

ACCREDITED
Calibration Services
Certificate Number: 1550.01
Laboratory code: 115953

Report of Calibration

Firm: Dirigo Laboratories
Address: 11785 SE Hwy 212, Ste 305
City/State/Zip: Clackamas, OR 97015

Test Completed: 01/15/16
Purchase Order: 1001
Traceable Number: 20152489

Test Item: 20lb and 10lb Individual Grip Handle Weights
Serial No.: Listed in Table

Manufacturer: Unknown

Laboratory Environment at time of test

Temperature °C	Pressure mmHg	Humidity %RH
21.448	760.64	44.58

Conventional Mass Value

Nominal Value	As Found pounds	As Found Correction* (mg)	Uncertainty (mg)	Tolerance (mg)
20lb #098	19.9995450	-206.4	6.4	910
10lb #097	10.0006510	295.3	5.1	450
10lb #051	10.0003421	155.2	5.1	450

*Correction is the difference between the conventional mass value of a weight and its nominal value.

Comments: These weights were received in good condition and were within NIST Handbook 105-1 Class F tolerances As Found. No adjustments or changes were made so As Found values should be considered to be As Left values.

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Quality Control Services, Inc.
Metrology Laboratory Manager
E-mail dthompson@qc-services.com

Date: 01/15/16

Signature David S. Thompson

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(503) 236-2712 • FAX (503) 235-2535 • www.qc-services.com

A2LA ACCREDITED
CERTIFICATE #1550.01

PFS Teco
11785 SE Hwy 212 STE#305
Clackamas, OR 97015

Report Number: DIRI0134307497181218

A2LA ACCREDITED
CERTIFICATE OF CALIBRATION WITH DATA

INSTRUMENT INFORMATION

Item	Make	Model	Serial Number	Customer ID	Location
Balance	Sartorius	ENTRIS224-1S	34307497	#107	Lab
Units	**Readability**	**SOP**	**Cal Date**	**Last Cal Date**	**Cal Due Date**
g	0.0001	QC012	12/18/18	6/13/18	12/2019

FUNCTIONAL CHECKS

ECCENTRICITY
Test Wt: 100 Tol: 0.0003
As-Found: Pass: ☑ Fail: ☐
As-Left: Pass: ☑ Fail: ☐

LINEARITY
Test Wt: 50 x 4 Tol: 0.0002
As-Found: Pass: ☑ Fail: ☐
As-Left: Pass: ☑ Fail: ☐

STANDARD DEVIATION
Test Wt: 100 Tol: 0.0001

1. 100.0001	5. 100.0002	9. 100.0001
2. 100.0001	6. 100.0001	10. 100.0001
3. 100.0001	7. 100.0001	**Result**
4. 100.0001	8. 100.0002	0.00004

ENVIRONMENTAL CONDITIONS
☐ Good ☑ Fair ☐ Poor
Temperature: 21.3°C

A2LA ACCREDITED SECTION OF REPORT

Standard	As-Found	As-Left	Expanded Uncertainty
200	200.0002	200.0001	0.00014
100	100.0001	100.0001	0.00014
50	50.0003	50.0001	0.00014
20	20.0001	20.0001	0.00014
1	1.0001	1.0000	0.00014
0.1	0.1000	0.1000	0.00014

CALIBRATION STANDARDS

Item	Make	Model	Serial Number	Cal Date	Cal Due Date	NIST ID
Weight Set	R.L./Troemner	10kg to 1mg	G782	1/3/18	1/2019	20172421

Permanent Information Concerning this Equipment:
12 month calibration cycle.

Comments/Info Concerning this Calibration:
12/18 - RH = 56%. Adjusted span.

Report prepared/reviewed by: ServiceTech JC **Date:** 12/28/18 **Technician:** R.Kauble

Signature:

THIS CERTIFICATE SHALL NOT BE REPRODUCED WITHOUT THE APPROVAL OF QUALITY CONTROL SERVICES, INC.

The uncertainty is calculated according to the ISO Guide to the Expression of Uncertainty in Measurement and includes the uncertainty of standards used combined with the observed standard deviation and readability of the unit under test. The uncertainty is expanded with a k factor of 2 for an approximate 95% level of confidence. Instruments listed above were calibrated using standards traceable to the National Institute of Standards and Technology (NIST). Calibration data reflect results at the time and location of calibration. Calibration data should be reviewed to insure that the instrument is performing to its required accuracy. Calibrations comply with ISO/IEC 17025 and ANSI/Z540-1-1994 quality standards.

Verification of Standardization

of

Tape Measure

by

Advanced Calibration Technologies
28111 S.E. Wally Road
Boring, OR 97009
1-800-259-5058

ACCREDITED
Calibration
Cert# 1342.01

Customer:	PFS Teco, Inc	Street:	11785 Southeast Highway 212 Suite 305
City:	Clackamas State: OR	Zip:	97015 Location: In House
Machine Manufacturer:	Dewalt	Model:	16' Tape Measure
Capacity:	0.000 - 192.000 inches 0.125 Divisions	Serial #:	090
Calibration Cycle:	12 Months	Lab ID#:	#090
Previous Calibration Date:	January 2019	Calibration Procedure:	Ad-Tek SR
Equipment Used:	Gauge Blocks S/N: ADGB002	Action Recommended:	
If Other, Explain:			

Verification Data

Purpose:

This method provides instructions for checking the critical dimensions of the equipment.

Tolerance:

Equipment shall meet the dimensional tolerances specified in the applicable test method.

Procedure:

Verified using manufacturer's procedures.

Actual Dimensions (inches)	Unit Under Test As Found (inches)	Unit Under Test As Left (inches)	Difference (inches)
0.0000	0.000	0.000	0.000
0.1250	0.050	0.050	-0.075
0.2500	0.250	0.250	0.000
0.5000	0.500	0.500	0.000
0.7500	0.750	0.750	0.000
1.0000	1.000	1.000	0.000
3.0000	3.000	3.000	0.000
5.0000	5.000	5.000	0.000
7.0000	7.000	7.000	0.000
9.0000	9.000	9.000	0.000
12.0000	12.000	12.000	0.000

The overall condition of the device as found:	Within Specification
The overall condition of the device as left:	Within Specification
The measurement of uncertainty (MU) was calculated to be:	0.00060

File No: PFS-101666-0119D0120-AH-SR-090

Temperature: 72.1°F Humidity: 41.1%

The equipment used in the verification of this instrument has been calibrated and is NIST traceable.
The uncertainty of calibration was estimated at the 95% confidence level, coverage factor (k=2).

Remarks:

This certificate of verification is issued as a statement of fact that on the date of verification the above instrument had an accuracy as indicated and was calibrated to meet the requirements of the manufacturer's specifications. This certificate should not be construed or regarded as a guarantee or warranty of any kind that the instrument will retain the same percentage of accuracy as determined on the date when the verification was performed and reported. Ad-Tek, Inc. hereby expressly disclaims any and all liability for damage or loss by all parties arising or resulting from deterioration, obsolescence, malfunction, subsequent calibration performed by another agency or substandard performance of said instrument.

This report and certificate of verification shall not be reproduced except in full, without the written approval of Ad-Tek, Inc.

Service Technician: Alisa Houser Date of Service: January 16, 2019

Technical Manager: Nicole Ostrowski Date Next Due: January 2020

We sincerely appreciate your business and thank you for selecting Advanced Calibration Technologies, Inc. for servicing your equipment.
To reschedule, please call (800) 259-5058. Thank You.

DICK MUNNS COMPANY
LIQUID & GAS FLOW CALIBRATION

ISO 17025 IAS ACCREDITED
CL-122

CERTIFICATE OF CALIBRATION

CUSTOMER:	**PFS-TECO :** CLACKAMAS, OR	**CALIBRATION DATE:**	03/14/2019
PO NUMBER:	N/A	**CALIBRATION DUE:**	03/14/2020
INST. MANUFACTURER:	DWYER	**PROCEDURE:**	T.O.33K6-4-1769-1
INST. DESCRIPTION:	VELOMETER	**CALIBRATION FLUID:**	AIR @ 14.7 PSIA 70°F
MODEL NUMBER:	471	**RECEIVED CONDITION:**	WITHIN MFG. SPECS.
SERIAL NUMBER:	CP288559 (ID# 095)	**LEFT CONDITION:**	WITHIN MFG. SPECS.
RATED UNCERTAINTY:	SEE NOTES BELOW.	**AMBIENT CONDITIONS:**	762 mm HGA 43% RH 69°F
UNCERTAINTY GIVEN:	± .20% RD ; k=2	**CERTIFICATE FILE #:**	490265.2019

NOTES: ± 3% FS (0-500 / 0-1500) *** ± 4% F.S. (0-5000) ***± 5% F.S. (0-15000) *** ± 2 °F

NOTES CONT. : Q.MANUAL IM 1.5 REV 2017.1 DATED 7-18-2017

UUT INDICATED FT/MIN	DM.STD. ACTUAL FT/MIN	UUT INDICATED DEG. F	DM STD. ACTUAL DEG. F
64	65	0 TO 200°F	0 TO 200°F
110	112	43.4	43.5
206	210	69.0	68.9
498	509	99.4	99.2
503	505		
1049	1058		
1497	1514		
509	513		
3419	3460		
4992	5068		
5136	5235		
13928	14232		

STANDARDS USED:		
A220: 12" WIND TUNNEL 0 - 8000 FPM | CMC ± .203% RD | TRACE# 1520423238	DUE	05/23/2019
A24: HART SCIENTIFIC TEMP. STANDARD | ±.024 F | TRACE# 1520423238	DUE	03/07/2020

All instruments used in the performance of the shown calibration have traceability to the National Institute of Standards and Technology (NIST). The uncertainty ratio between the calibration standards (DM.STD.) used and the unit under test (UUT) is a minimum of 4:1, unless otherwise noted. Calibration has been performed per the shown procedure number, in accordance with ISO 10012:2003, ISO 17025:2005, ANSI/NCSL-Z-540.3, and/or MIL-STD-45662A. Test methods: API2530-92 & ASME MFC-3M-1989.

Dick Munns Company • 11133 Winners Circle • Los Alamitos, CA 90720
Phone (714) 827-1215 • Fax (714) 827-0823

This Calibration Certificate shall not be reproduced except in full without approval by DICK MUNNS COMPANY. The data shown applies only to the instrument being calibrated and under the stated conditions of calibration.

Date: 3/14/2019

Approved By:

Calibration Technician:

Model 1430 Microtector® Electronic Point Gage

Installation and Operating Instructions



Model 1430 Microtector® Portable Electronic Point Gage combines modern, solid-state integrated circuit electronics with a time-proven point gage manometer to provide fast, accurate pressure measurements.

SPECIFICATIONS AND FEATURES

- Accurate and repeatable to ± .00025 inches water column
- Pressure range: 0 - 2″ w.c., positive, negative, or differential pressures
- Non-toxic and inexpensive gage fluid consists of distilled water mixed with a small amount of fluorescein green color concentrate
- Convenient, portable, lightweight and self-contained, the unit requires no external power connections and is operated by a 1.5 volt penlight cell
- A.C. detector current eliminates point plating, fouling and erosion
- Micrometers are manufactured in accordance with ASME B89.1.13-2001, and are traceable to a standard at the National Institute of Standards and Technology
- Three-point mounting, dual leveling adjustment, and circular level vial assure rapid setup
- Durablock® precision-machined acrylic plastic gage body
- Sensitive 0 - 50 microamp D.C. meter acts as a detector and also indicates battery and probe condition
- Heavy 2″ thick steel base plate provides steady mounting
- Top-quality glass epoxy circuit board and solid-state, integrated circuit electronics
- Electronic enclosure of tough, molded styrene acrylonitrile provides maximum protection to components yet allows easy access to battery compartment
- Rugged sheet steel cover and carrying case protects the entire unit when not in use
- Accessories included are (2) 3-foot lengths Tygon® tubing, (2) 1/8″ pipe thread adapters and 3/4 oz. bottle of fluorescein green color concentrate with wetting agent

Maximum pressure: 100 psig with optional pipe thread connections.

Tygon® is a registered trademark of Saint-Gobain Corporation

DWYER INSTRUMENTS, INC.
P.O. BOX 373
MICHIGAN CITY, INDIANA 46361,U.S.A
Phone: 219/879-8000
Fax: 219/872-9057
www.dwyer-inst.com
e-mail: info@dwyer-inst.com

J-2000

owner's manual



DELMHORST®
INSTRUMENT CO.

WHEN ACCURACY IS THE POINT.™

NorLAB®
A DIVISION OF NORCO, INC.

Calibration Gases & Equipment

CERTIFICATE OF ANALYSIS

Central Gases/ Div of CWS

4429 Airport Way S.
Seattle, WA 98108

Cust Number H1205
Order Number 59682169
PO Number XC101846

Lot Number 8-313-121
Part Number SPG 2C1016.5VM4
Cylinder Size 30A
Pressure 2200 psig @ 70°F

Date Analyzed 11/12/18
Expires 11-2021
Analytical Accuracy +/- 2%

Cylinder Number(s)
EA0015365

Component	Reported Concentration	Requested Concentration	Analytical Method
Carbon Dioxide	9.00 %	9 %	Gravimetric
Carbon Monoxide	0.500 %	0.5 %	Gravimetric
Nitrogen	Balance	Balance	Gravimetric

Storage: Keep away from heat, flames, and sparks. Store and use with adequate ventilation. Close valve when not in use and when empty. Never allow cylinder temperature to exceed 125 degrees F.

Approved: _____
Jeff Korn
Lab Technician

Date Signed: November 12, 2018

The cylinders in this lot were prepared gravimetricaly and are traceable to the NIST by certified weights used to calibrate the scales.
The cylinders were then analyzed against standards traceable to the NIST by weights or SRM's.
NIST Traceability Numbers are available upon request.

898 W. GOWEN ROAD • BOISE, IDAHO 83705
Phone (208) 336-1643 • Fax (208) 331-3038 • 800-657-6672